SOIL SURVEY OF

DeWitt County, Texas

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Texas Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1965–72. Soil names and descriptions were approved in 1973. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1973. This survey was made cooperatively by the Soil Conservation Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the De Witt County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and ranches; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All of the soils of De Witt County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number of the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and range site to which the soil has been assigned.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units, the range sites, and the pasture and hayland groups.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife Habitat."

Ranchers and others can find, under "Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings and industrial buildings and for recreational areas in the sections "Recreation" and "Engineering."

Engineers and builders can find, under "Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in De Witt County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication and in the section "General Nature of the County."

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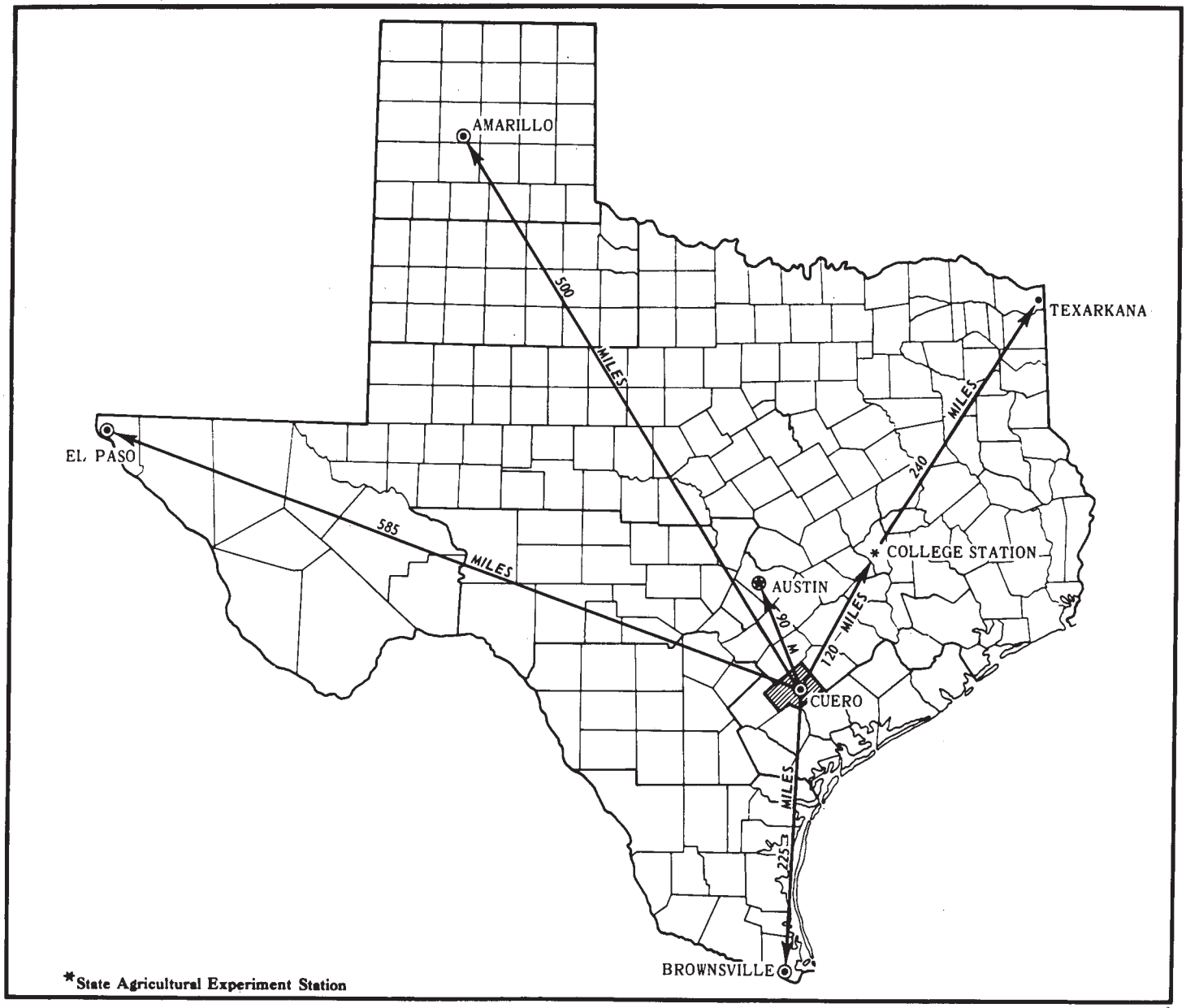

Location of De Witt County in Texas.

SOIL SURVEY OF DE WITT COUNTY, TEXAS

By William M. Miller, Soil Conservation Service

Fieldwork by Roy H. L. Bruns, Thomas E. Cyprian, Larry W. Hausmann, James E. Bower and Irvin C. Mowery, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in Cooperation With the Texas Agricultural Experiment Station

DE WITT COUNTY is in the eastern part of south-central Texas. It is bordered on the north by Lavaca and Gonzales Counties, on the west by Karnes County, and on the south by Goliad and Victoria Counties. The total area of the county is about 910 square miles, or 582,400 acres. The county is mostly rectangular. The longest part extends from northeast to southwest, and the shortest from northwest to southeast (see facing page). Cuero, approximately in the center of the county, is the county seat.

Farming is the main enterprise. About 90 percent of the acreage is range, and beef cattle the chief livestock. Poultry and dairy farming are also important. About 10 percent of the acreage is used for crops, mainly grain sorghum and corn. Smaller acreages are in cotton, improved pasture, forage sorghum, pecans, peanuts, and watermelons.

How This Survey was Made

Soil scientists made this survey to learn what kinds of soil are in De Witt County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Buchel and Leemont, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Crockett fine sandy loam, 1 to 3 percent slopes, is one of several phases within the Crockett series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of De Witt County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Denhawken-Elmendorf complex, 0 to 3 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are

shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Crockett soils, 2 to 5 percent slopes, eroded, is an example.

In a few areas surveyed there are places where the soil material is such that it has not been classified by soil series. These places are shown on the soil map, but are only classified in the Great Group. Natraqualfs is an example.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this failure to the slow permeability of the soil or its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association can occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a survey area, who want to compare different parts of that area, or who want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide for broad planning on a watershed, a wooded tract, or a wildlife area or for broad planning of recreational facilities, community developments and such engineering works as transportation corridors. It is not a suitable map for detailed planning for management of a farm or field or for selecting the exact location of a road or building or other structure, because the soils within an association ordinarily vary in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in De Witt County have been grouped into general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the 10 soil associations are described on the following pages.

Terms denoting texture in the title of most of the associations apply to the texture of the surface layer.

Deep Loamy and Sandy and Gravelly and Very Gravelly Sandy Soils of the Uplands

The soils in this group are neutral to acid and have very low to high available water capacity and very slow to medium runoff. They are used mostly for range. In small areas they are used for crops and improved pasture. In some they are mined for gravel. Most of the soils are well suited to range and wildlife. Many are suited to pasture and to recreational use. Some of the less sloping and better drained soils are suited to crops.

1. Leming-Papalote association

Nearly level to gently sloping, moderately well drained, slowly permeable, noncalcareous sandy and loamy soils

This association is on uplands. It makes up about 28 percent of the county. It is about 28 percent Leming soils, 23 percent Papalote soils, and 49 percent minor soils.

The nearly level to gently sloping Leming soils occupy broad and narrow areas. They have a surface layer of pale brown loamy fine sand about 12 inches thick. Below this is about 14 inches of very pale brown loamy fine sand. The subsoil is about 42 inches thick. The upper 24 inches is sandy clay that is light brownish gray in the upper part and light gray mottled with yellowish brown and red in the lower part. The next 8 inches is reddish yellow sandy clay. The lower 10 inches is very pale brown sandy clay loam. The underlying material to a depth of 84 inches is very pale brown loamy fine sand and weakly cemented sandstone.

The nearly level to gently sloping Papalote soils also are in broad or narrow areas. They have a surface layer that is light brownish gray fine sandy loam about 9 inches thick. The subsoil is about 39 inches thick. The upper 11 inches is light brownish gray sandy clay mottled with yellowish red and brownish yellow; the next 20 inches is mottled light gray, brownish yellow, and reddish yellow sandy clay; and the lower 8 inches is red clay loam. The underlying material is pink sandy clay loam.

Also in this association are Sarnosa, Runge, Nueces, Sarita, Miguel, Orelia, Denhawken, and Elmendorf soils. Sarnosa, Runge, Nueces, Sarita, Denhawken, and Elmendorf soils occupy higher positions on the landscape. The Orelia soils occupy the lower positions.

This association is used mainly for range. A few areas are farmed. Most of the soils are suited to improved pasture. They are also suited to wildlife and to recreational use.

2. *Tremona association*

Nearly level to gently sloping, somewhat poorly drained, very slowly permeable, noncalcareous sandy soils

This association, which makes up about 13 percent of the county, is mainly on uplands. It is about 76 percent Tremona soils and 24 percent minor soils.

The nearly level to gently sloping Tremona soils occupy irregularly shaped areas. Their surface layer is loamy fine sand, about 28 inches thick, that is pale brown in the upper part and very pale brown in the lower part. The next 12 inches is gray sandy clay mottled with dark yellowish brown and red. The next 18 inches is light gray sandy clay mottled with yellowish red and yellowish brown. The underlying material to a depth of 84 inches is mottled white sandy clay loam.

Also in this association are Crockett, Catilla, Mabank, Straber, Denhawken, and Elmendorf soils. Some are higher on the landscape. Some are lower.

Most areas are used for range. A small part is improved pasture and crops.

This association is best suited to range and pasture. It is also suited to wildlife and recreation.

3. *Silvern-Ellen association*

Gently sloping to sloping, well drained and moderately well drained, moderately and moderately slowly permeable, noncalcareous gravelly and very gravelly sandy soils

This association is mainly on uplands. It makes up about 4 percent of the county. It is about 29 percent Silvern soils, 24 percent Ellen soils, and 47 percent minor soils.

The gently sloping to sloping Silvern soils occupy the higher positions on the landscape. Their surface layer is about 10 inches of light brownish gray very gravelly loamy sand. Below this is about 44 inches of pinkish gray very gravelly loamy sand, 8 inches of mottled light brown, white, and yellowish red very gravelly sandy clay loam, and 14 inches of dark red, firm very gravelly sandy clay loam mottled with light gray. The underlying material is yellowish brown gravelly sandy clay loam.

Ellen soils are in lower positions, below Silvern soils, and are mostly less sloping. They have a pale brown gravelly loamy sand surface layer about 8 inches thick. The next 20 inches is very pale brown very gravelly loamy sand. The next 24 inches is white very gravelly sandy clay loam mottled with dark red. The underlying material is mottled white gravelly sandy clay loam.

Also in this association are Garcitas, Straber, and Tremona soils.

This association is used mainly for range. In some areas the surface layer of the Silvern soils is mined for gravel.

4. *Fordtran association*

Nearly level, very slowly permeable, somewhat poorly drained, noncalcareous sandy soils

This association is mainly on uplands. It makes up about 4 percent of the county. It is about 65 percent Fordtran soils and 35 percent minor soils.

The nearly level Fordtran soils occupy broad areas. Their surface layer is light brownish gray loamy fine sand about 16 inches thick. Below this is about 12 inches of light gray loamy fine sand, 8 inches of white sandy clay mottled with strong brown and red, 12 inches of white sandy clay mottled with reddish yellow and yellowish brown, and 10 inches of white sandy clay loam mottled with brownish yellow and red. The underlying material is mottled light gray, red, and reddish yellow.

Also in this association are Garcitas, Edna, Silvern, and Ellen soils. Edna soils are in lower positions than the other soils.

This association is poorly suited to crops, but is well suited to range and wildlife. It is used mostly for range. Most of the association is also suited to improved pasture and recreational use. In most areas the Fordtran soils have excess water in the surface layer at some seasons.

Deep and Shallow Loamy Soils of the Uplands

The soils in this group are alkaline and have very low to medium available water capacity and slow to rapid runoff. They are used mostly for range. In a few areas they are used for crops or improved pasture. They are well suited to range and wildlife. In some areas they are suited to pasture and to recreational use. In some of the less sloping parts they are suited to crops.

5. *Sarnosa-Shiner association*

Nearly level to sloping, well drained, moderately permeable, calcareous loamy soils

This association is mainly on uplands. It makes up about 25 percent of the county. It is about 50 percent Sarnosa soils, 18 percent Shiner soils, and 32 percent minor soils.

The nearly level to sloping Sarnosa soils are on side slopes. Their surface layer is very dark gray fine sandy loam about 16 inches thick. Below this is about 18 inches of pale brown fine sandy loam over 18 inches of very pale brown sandy clay loam. The underlying material is very pale brown fine sandy loam.

The Shiner soils are on the ridgetops. Their surface layer is light brownish gray fine sandy loam about 6 inches thick. The next 10 inches is very pale brown gravelly fine sandy loam. The underlying material is yellow weakly cemented sandstone.

Also in this association are Miguel, Mabank, Runge, Heiden, Cuero, Monteola, Denhawken, Elmendorf, and Houston Black soils. All are on the lower parts of the landscape. The Mabank, Heiden, Cuero, and Houston Black soils are more common in the eastern part of the association. The Miguel, Runge, Monteola, Denhawken, and Elmendorf soils are commonly in the western part.

This association is well suited to range and wildlife, but is also suited to pasture and recreational use. It is used mostly for range. A few areas are in improved pasture.

Deep Loamy and Clayey Soils of the Uplands

The soils in this group are alkaline to acid and have medium to high available water capacity and very slow to rapid runoff. They are used mostly for range. In

many areas they are used for crops and improved pasture. Most areas are suited to range and wildlife. Many areas are well suited to improved pasture or to recreational use. The less sloping, better drained areas are well suited to crops.

6. *Crockett-Mabank association*

Nearly level to gently sloping, moderately well drained and somewhat poorly drained, very slowly permeable, noncalcareous loamy soils

This association is mainly on uplands. It makes up about 7 percent of the county. It is about 43 percent Crockett soils, 21 percent Mabank soils, and 36 percent minor soils.

Nearly level to gently sloping Crockett soils are on small ridges at higher elevations. Their surface layer is fine sandy loam about 9 inches thick. It is brown in the upper part and dark grayish brown in the lower part. The subsoil is about 42 inches thick. The upper 16 inches is dark grayish brown clay mottled with yellowish brown and red; the next 13 inches is light brownish gray, very firm clay mottled with yellowish brown and strong brown; the lower 13 inches is mottled brown, light yellowish brown, light gray, and red firm sandy clay. Below this is about 6 inches of mottled yellowish red and light gray sandy clay loam. The underlying material is reddish yellow loam.

Mabank soils are in the lower positions. They have a surface layer of gray fine sandy loam about 7 inches thick. The subsoil is about 49 inches thick. The upper 12 inches is very dark gray clay, the next 18 inches is dark gray clay, and the lower 19 inches is gray clay. The underlying material is light gray sandy clay loam.

Also in this association are Sarnosa, Catilla, Tremona, Wilson, Denhawken, and Elmendorf soils. Wilson soils are in the lower areas, and the other soils are in the irregular, gently sloping, slightly higher areas.

This association is suited to range and wildlife, and most of it is suited to improved pasture, crops, and recreational use. It is used mostly for range. A small part is in improved pasture and crops.

7. *Sarnosa-Monteola association*

Nearly level to sloping, well drained and moderately well drained, moderately and very slowly permeable, calcareous loamy and clayey soils

This association is mainly on uplands. It makes up about 6 percent of the county. It is about 50 percent Sarnosa soils, 29 percent Monteola soils, and 21 percent minor soils.

The nearly level to sloping Sarnosa soils are on the side slopes. Their surface layer is very dark gray fine sandy loam about 16 inches thick. Below this is about 18 inches of pale brown fine sandy loam and about 18 inches of very pale brown sandy clay loam. The underlying material is very pale brown fine sandy loam.

Monteola soils are in the higher areas. Their surface layer is very dark gray clay about 30 inches thick. Below this is about 10 inches of grayish brown clay and 12 inches of very pale brown clay. The underlying material is mottled very pale brown and yellow clay.

Also in this association are Papalote, Miguel, Runge, Shiner, Denhawken, and Elmendorf soils. The Shiner soils are on the ridgetops, and the other soils are in lower areas.

This association is well suited to range, wildlife, and recreational use. The less sloping areas are suited to crops. Most of the association is used for range. Part of it is in crops and improved pasture.

8. *Weesatche-Papalote association*

Nearly level to gently sloping, well drained and moderately well drained, moderately and slowly permeable, noncalcareous loamy soils

This association is mainly on uplands. It makes up about 5 percent of the county. It is about 55 percent Weesatche soils, 20 percent Papalote soils, and 25 percent minor soils.

The gently sloping Weesatche soils are in the higher positions. They have a surface layer of dark gray clay loam about 8 inches thick. The subsoil is sandy clay loam about 22 inches thick. The upper 9 inches is dark grayish brown, the next 13 inches is reddish brown mottled with red, and the lower 8 inches is reddish yellow mottled with red. The underlying material is about 22 inches of pink loam over stratified, white loamy earth and weakly cemented calcium carbonate.

Papalote soils, also gently sloping, are in lower areas. They have a surface layer of light brownish gray fine sandy loam about 9 inches thick. The subsoil, about 39 inches thick, is mottled light brownish gray sandy clay in the upper 11 inches, mottled sandy clay in the next 10 inches, and red clay loam in the lower 8 inches. The underlying material is pink sandy clay loam.

Also in this association are Leming, Miguel, Runge, Orelia, Sarnosa, Shiner, Denhawken, and Elmendorf soils. All but the Shiner and Sarnosa soils are in lower areas.

This association is suited to range and wildlife. Most areas are also suited to pasture and recreational use. Some less sloping areas are suited to crops. Most of the association is in range. Some of it is farmed, and some is in improved pasture.

9. *Heiden-Houston Black association*

Nearly level to gently sloping, very slowly permeable, well drained and moderately well drained, calcareous clayey soils

This association is mainly on uplands. It makes up about 2 percent of the county. It is about 45 percent Heiden soils, 22 percent Houston Black soils, and 33 percent minor soils.

The gently sloping Heiden soils are on higher parts of the landscape. Their surface layer is dark grayish brown clay about 30 inches thick. The next 12 inches is grayish brown clay. The underlying material to a depth of 60 inches is light olive silty clay.

The nearly level to gently sloping Houston Black soils also are on higher parts of the landscape. They have a surface layer of very dark gray clay about 6 inches thick. The next 34 inches is dark gray clay that is mottled with yellowish brown in the lower part. Below this, to a depth of 74 inches, is grayish brown clay mottled with yellowish brown. The underlying material is grayish brown clay mottled with yellowish brown.

Also in this association are Sarnosa, Crockett, Wilson, and Mabank soils, all of which are on lower parts of the landscape.

This association is well suited to range and wildlife and in most areas is well suited to crops and improved pasture. It is also suited to recreational use. Most of the association is used for native range. A small part is in crops and improved pasture.

Deep Loamy and Clayey Soils of the Bottom Land

The soils in this group are alkaline and have high available water capacity and slow to very slow runoff. They are used mostly for range, but in some areas they are used for crops and in a few for improved pasture. The soils are well suited to range and wildlife. In most areas they are also well suited to improved pasture, crops, and recreational use.

10. Meguin-Trinity association

Nearly level, moderately and very slowly permeable, well drained and somewhat poorly drained, calcareous loamy and clayey soils

This association is mainly on bottom land. It makes up about 6 percent of the county. It is about 65 percent Meguin soils, 10 percent Trinity soils, and 25 percent minor soils.

The Meguin soils have a dark grayish brown surface layer of silty clay loam about 12 inches thick. Below this is 6 inches of grayish brown silty clay loam over 26 inches of pale brown silty clay loam. The underlying material is very pale brown loam.

The Trinity soils have a surface layer of dark gray clay about 36 inches thick. Below this is dark gray clay about 28 inches thick. The underlying material is gray clay.

Also in this association are Buchel, Sinton, and Degola soils.

This association is well suited to range, improved pasture, and crops. It is also suited to wildlife and recreational use. Most of it is used for range. A small part is in crops and improved pasture, and a few areas are in pecan trees.

Descriptions of the Soils

This section describes the soil series and mapping units in De Witt County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, more detailed, is for those who need to make thorough and precise studies of soils. Color terms are for dry soil unless otherwise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit differs from the one described for the series, these differences are stated in describing the mapping unit, or they are apparent in the name of the mapping unit. The percentage of coarse fragments is a volume measurement.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Natraqualfs, for example, do not belong to a soil series, but nevertheless, are listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, range site, and pasture and hayland group to which the mapping unit has been assigned. The page for the description of each interpretative group can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual *(3)*.[1]

Branyon Series

The Branyon series consists of deep, nearly level, calcareous clayey soils of the uplands. These soils formed in calcareous clayey alluvial sediments.

In a representative profile the surface layer is clay. The upper 36 inches is dark gray, and the lower 14 inches is gray. The underlying material to a depth of 84 inches is light gray silty clay.

These soils are moderately well drained and have slow runoff. Water enters rapidly when the soil is dry and cracked, but permeability is very slow when the soil is moist and the cracks are closed. The available water capacity is high.

Most areas have been used for crops, but are now used for grazing. Some have been established to improved pasture grasses, and some are in range.

Representative profile of Branyon clay, 0 to 1 percent slopes, 10.8 miles north on U.S. Highway 183 from the intersection of U.S. Highways 183 and 87 in Cuero, 0.75 mile west on a county road; 0.7 mile north and northwest on a private road to a house; 650 feet west of house along a private road; 30 feet south; in crops:

Ap—0 to 6 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate very fine granular structure; extremely hard, very firm, sticky and plastic; few fine roots; few ferromanganese concretions; calcareous; moderately alkaline; abrupt smooth boundary.

A11—6 to 36 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure that forms parallelepipeds; extremely hard, very firm, sticky and plastic; few fine roots; few fine calcium carbonate concretions; few fine ferromanganese concretions; common coarse grooved slickensides; calcareous; moderately alkaline; gradual wavy boundary.

A12—36 to 50 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate medium angular blocky structure that forms parallelepipeds; very

[1] Italic numbers in parentheses refer to Literature Cited, p. 77.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Branyon clay, 0 to 1 percent slopes	840	0.1	Nueces-Sarita complex, 0 to 5 percent slopes	5,800	1.0
Buchel clay, occasionally flooded	2,930	.5	Orelia fine sandy loam, 0 to 2 percent slopes	11,260	2.0
Catilla fine sand, 0 to 5 percent slopes	8,970	1.5	Papalote fine sandy loam, 0 to 1 percent slopes	1,240	.2
Crockett fine sandy loam, 0 to 1 percent slopes	1,500	.2	Papalote fine sandy loam, 1 to 3 percent slopes	43,430	7.5
Crockett fine sandy loam, 1 to 3 percent slopes	11,400	1.9	Runge fine sandy loam, 0 to 1 percent slopes	2,580	.4
Crockett fine sandy loam, 3 to 5 percent slopes	3,400	.6	Runge fine sandy loam, 1 to 3 percent slopes	16,000	2.7
Crockett soils, 2 to 5 percent slopes, eroded	7,370	1.3	Runge fine sandy loam, 3 to 5 percent slopes	2,740	.5
Cuero sandy clay loam, 0 to 2 percent slopes	6,930	1.2	Sarnosa fine sandy loam, 0 to 1 percent slopes	2,400	.4
Degola clay loam, occasionally flooded	1,540	.3	Sarnosa fine sandy loam, 1 to 3 percent slopes	33,900	5.8
Degola soils, frequently flooded	3,280	.6	Sarnosa fine sandy loam, 3 to 5 percent slopes	34,630	6.0
Denhawken-Elmendorf complex, 0 to 3 percent slopes	16,800	2.9	Sarnosa fine sandy loam, 5 to 8 percent slopes	13,030	2.2
Edna fine sandy loam, 0 to 1 percent slopes	2,650	.5	Sarnosa soils, 3 to 5 percent slopes, eroded	9,440	1.6
Ferris soils, 3 to 5 percent slopes, eroded	1,330	.2	Shiner fine sandy loam, 1 to 5 percent slopes	16,390	2.8
Fordtran loamy fine sand, 0 to 1 percent slopes	15,320	2.6	Shiner fine sandy loam, 5 to 8 percent slopes	10,400	1.8
Garcitas gravelly loamy fine sand, 0 to 3 percent slopes	8,810	1.5	Silvern-Ellen complex, 1 to 8 percent slopes	12,500	2.2
Goldmire very gravelly soils, 1 to 8 percent slopes	3,270	.6	Sinton loam	1,630	.3
Heiden clay, 1 to 3 percent slopes	2,490	.4	Straber loamy fine sand, 0 to 1 percent slopes	3,500	.6
Heiden clay, 3 to 5 percent slopes	3,050	.5	Straber loamy fine sand, 1 to 5 percent slopes	12,670	2.2
Houston Black clay, 0 to 1 percent slopes	770	.1	Tremona loamy fine sand, 0 to 5 percent slopes	50,000	8.6
Houston Black clay, 1 to 3 percent slopes	2,230	.4	Tremona gravelly loamy sand, 1 to 5 percent slopes	24,220	4.2
Leemont clay, 3 to 5 percent slopes	6,980	1.2	Trinity clay, occasionally flooded	3,320	.6
Leemont clay, 5 to 8 percent slopes	940	.2	Trinity clay, frequently flooded	1,930	.3
Leming loamy fine sand, 0 to 5 percent slopes	47,060	7.9	Valco sandy clay loam, 1 to 8 percent slopes	770	.1
Lupe gravelly sandy clay loam, 1 to 8 percent slopes	2,920	.5	Weesatche sandy clay loam, 1 to 3 percent slopes	22,500	3.9
Mabank fine sandy loam, 0 to 1 percent slopes	6,840	1.2	Weesatche sandy clay loam, 3 to 5 percent slopes	3,870	.7
Mabank fine sandy loam, 1 to 3 percent slopes	5,510	.9	Wilson clay loam, 0 to 1 percent slopes	9,620	1.7
Meguin silty clay loam, occasionally flooded	19,370	3.3	Wilson clay loam, 1 to 3 percent slopes	4,170	.7
Meguin soils, frequently flooded	9,500	1.7	Zalla fine sand, occasionally flooded	4,180	.7
Miguel fine sandy loam, 3 to 5 percent slopes	5,980	1.0	Total	582,400	100.0
Miguel fine sandy loam, 3 to 5 percent slopes, eroded	3,570	.6			
Monteola clay, 0 to 1 percent slopes	1,880	.3			
Monteola clay, 1 to 3 percent slopes	8,500	1.5			
Natraqualfs	350	.1			

hard, very firm, sticky and plastic; common fine calcium carbonate concretions; few fine ferromanganese concretions; many fine slickensides; calcareous; moderately alkaline; gradual wavy boundary.

AC1—50 to 70 inches, light gray (10YR 7/2) silty clay, light brownish gray (10YR 6/2) moist; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; few soft masses and weakly cemented concretions of calcium carbonate; few fine ferromanganese concretions; calcareous; moderately alkaline; gradual wavy boundary.

AC2—70 to 84 inches, light gray (10YR 7/2) silty clay, light gray (10YR 6/2) moist, few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; very hard, very firm, sticky and plastic; calcareous; moderately alkaline.

The solum is 60 to 90 inches thick. The A horizon is 40 to 70 inches thick. It is dark gray or very dark gray in the upper part and gray in the lower part. Common slickensides are below a depth of about 12 to 24 inches. The extremes of amplitude or waviness of the boundary between the A and AC horizons vary from about 4 to 17 inches. In most years cracks at least 1 centimeter wide extend to a depth of 20 inches and remain open from 90 to 150 days.

The AC horizon is gray, light gray, light brownish gray, grayish brown, pale brown, or light yellowish brown. The texture is clay or silty clay.

BrA—Branyon clay, 0 to 1 percent slopes. This nearly level soil is on ancient terraces. Areas range from 30 to 150 acres or more in size. They are irregular in shape.

Included in some mapped areas of this soil are 1- to 4-acre areas of Wilson, Houston Black, and Heiden soils. Also included are areas of Branyon clay that have slopes of 1 to 3 percent. Included soils make up less than 10 percent of any mapped area.

This Branyon soil is well suited to crops, but most areas are now used for grazing livestock. A few are used for crops. Some are in improved pasture of intro-

duced grasses. Soil blowing and water erosion are slight hazards. Capability unit IIw–3; Blackland range site; pasture and hayland group 7A.

Buchel Series

The Buchel series consists of deep, nearly level, calcareous clayey soils of low terraces. These soils formed in clayey alluvial sediments.

In a representative profile the surface layer is dark gray clay about 16 inches thick. The next 52 inches is clay. It is grayish brown in the upper 24 inches and light brownish gray in the lower 28 inches. The underlying material to a depth of 84 inches is light gray clay.

These soils are moderately well drained and have slow runoff. Water enters rapidly when the soil is dry and cracked, but permeability is very slow when the soil is moist and the cracks are closed. The available water capacity is high.

Most areas are used for range. Some are used for crops, some for improved pasture, and some for pecan trees.

Representative profile of Buchel clay, occasionally flooded, 4.7 miles north on U.S. Highway 183 from the intersection of U.S. Highways 183 and 87 in Cuero; 0.6 mile west and south on a county road; 0.6 mile west-northwest through a cattle guard to the northeast corner of a field; 350 feet west and 150 feet south; in crops:

Ap—0 to 16 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate fine subangular blocky structure; very hard, firm, very sticky; common fine roots; few snail shell fragments; calcareous; moderately alkaline; gradual wavy boundary.

AC1—16 to 40 inches, grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; common parallelepipeds tilted 30° to 45° from the horizontal; few slickensides; very hard, firm, very sticky, very plastic; common fine roots; few snail shell fragments; calcareous; moderately alkaline; gradual wavy boundary.

AC2—40 to 68 inches, light brownish gray (10YR 6/2) moist clay; common parallelepipeds tilted 30° to 45° from the horizontal, parting to weak fine subangular blocky structure; extremely hard, very firm, very sticky, very plastic; few intersecting slickensides; few weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

C—68 to 84 inches, light gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; massive; extremely hard, very firm, very sticky, very plastic; few weakly cemented calcium carbonate concretions; calcareous; moderately alkaline.

The solum is 46 to 78 inches thick. The A horizon is 12 to 32 inches thick and is dark gray or very dark gray. The texture between depths of 10 and 40 inches is clay or silty clay. Clay content ranges from 45 to 60 percent. The amplitude of waviness of the boundary between the A and AC horizons ranges from 5 to about 16 inches. The AC horizon is light brownish gray, grayish brown, or pale brown. The C horizon is light gray, pale brown, or very pale brown.

Bu—Buchel clay, occasionally flooded. This nearly level soil is on terraces along the outer edges of the flood plain. It is flooded on the average of once each 4 to 10 years. Areas are irregular in shape and range from about 25 to 140 acres in size.

Included in some mapped areas of this soil are 3- to 8-acre areas of a soil that is similar to the Buchel soil but has a lighter colored surface layer, and small narrow areas of a soil that is similar to the Buchel soil but has a thicker, dark-colored surface layer. Also included are narrow 2- to 4-acre areas of Meguin soils. Included soils make up less than 15 percent of any mapped area.

Most areas are used as range. Several areas are used for crops and a few are established to improved pasture. Some are used for pecan trees. The hazards of soil blowing and water erosion are slight. Capability unit IIw–3; Clayey Bottomland range site; pasture and hayland group 7A.

Catilla Series

The Catilla series consists of deep, nearly level to gently sloping, noncalcareous sandy soils of the uplands. These soils formed in sandy to loamy material that has been reworked by wind.

In a representative profile the surface layer is fine sand about 46 inches thick. It is light brownish gray in the upper 10 inches and very pale brown in the lower 36 inches. The next layer is sandy clay loam to a depth of 75 inches. It is light yellowish brown in the upper 19 inches and light gray in the lower 10 inches.

These soils are moderately well drained and have very slow runoff. Permeability is moderately slow, and the available water capacity is low.

Most areas are used for range. A few are in improved pasture.

Representative profile of Catilla fine sand, 0 to 5 percent slopes, about 4 miles north of Cuero to the junction of U.S. Highways 183 and 77A; then north on U.S. Highway 77A, 4.9 miles to the Edgar Community on U.S. Highway 77A; then 0.15 mile east, 0.95 mile south, and 0.55 mile east on a county road, and 310 feet south of road corner; in a pasture:

A1—0 to 10 inches, light brownish gray (10YR 6/2) fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; common roots; slightly acid; clear smooth boundary.

A2—10 to 46 inches, very pale brown (10YR 8/4) fine sand, very pale brown (10YR 7/4) moist; single grained; loose, very friable; few fine roots; few fine siliceous pebbles; medium acid; clear wavy boundary.

B21t—46 to 52 inches, light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; few fine and medium distinct light gray (10YR 7/1) mottles; weak coarse blocky structure; very hard, firm; few fine roots; many medium pores; strongly acid; gradual smooth boundary.

B22t—52 to 65 inches, light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; common coarse prominent dark red (10R 3/6) and few fine faint light gray (10YR 7/1) mottles; weak coarse blocky structure; very hard, firm; few distinct clay films in pores; about 5 percent plinthite within the dark red mottled areas; strongly acid; gradual smooth boundary.

B23t—65 to 75 inches, light gray (10YR 7/1) sandy clay loam; many coarse dark red (10R 3/6) and few fine and medium yellowish brown (10YR 5/4) prominent mottles; weak coarse blocky structure; very hard, firm; about 10 percent plinthite within the dark red mottled areas; strongly acid.

The solum is 60 to more than 100 inches thick.

The A1 horizon is 3 to 16 inches thick. It is grayish brown, light brownish gray, pale brown, or very pale brown. Reaction is slightly or medium acid. Coarse fragments of siliceous pebbles in the A1 and A2 horizons range from none to about 10 percent.

The A2 horizon is 22 to 44 inches thick. It is brown, very pale brown, light gray, or white loamy fine sand or fine sand. Reaction is slightly or medium acid.

The B2t horizon is pale brown, very pale brown, light yellowish brown, yellowish brown, or light gray mottled in shades of red, yellow, and gray. Mottles are few or common in the upper part, but increase in abundance and size with increasing depth. Some profiles are as much as 10 percent coarse fragments, mainly siliceous pebbles. The B2t horizon is medium acid through very strongly acid.

CaC—Catilla fine sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is on uplands. Areas range from 15 to 200 acres or more in size. They are irregular to oval in shape.

Included in some mapped areas of this soil are 1- to 5-acre areas of Tremona soils. Included soils make up less than 12 percent of any one mapped area.

This soil is poorly suited to crops. Nearly all the acreage is used for range. A few scattered areas are in improved pasture. Soil blowing is a severe hazard, and water erosion a slight hazard. Capability unit IIIe–9; Deep Sand Savannah range site; pasture and hayland group 9B.

Crockett Series

The Crockett series consists of deep, nearly level to gently sloping, noncalcareous loamy soils of the uplands. These soils formed in clay or shale interbedded with sandier material.

In a representative profile the surface layer is fine sandy loam about 9 inches thick. It is brown in the upper part and dark grayish brown in the lower part. The subsoil is about 42 inches thick. The upper 16 inches is mottled dark grayish brown clay, the next 13 inches is mottled light brownish gray clay, and the lower 13 inches is mottled brown sandy clay. The next 6 inches is mottled light gray sandy clay loam. The underlying material to a depth of 84 inches is reddish yellow loam.

These soils are moderately well drained and have slow to rapid runoff. They are very slowly permeable. The available water capacity is high.

Most areas are used as range. A few are used for crops, and a few are in improved pasture.

Representative profile of Crockett fine sandy loam, 1 to 3 percent slopes, 2.4 miles west on a county road from the intersection of U.S. Highway 77A (business) and U.S. Highway 77A (bypass) at the southwest edge of Yoakum; 1.3 miles south on a county road; 0.95 mile west; 0.25 mile north on private road; 150 feet east and 40 feet south of road; in range:

Ap—0 to 4 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; very hard and crusty dry, very friable moist; common fine roots; few fine siliceous pebbles; medium acid; abrupt wavy boundary.

A1—4 to 9 inches, dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; very hard, very friable; common fine roots; medium acid; abrupt wavy boundary.

B21t—9 to 25 inches, coarsely mottled dark grayish brown (10YR 4/2) and reddish brown (5YR 4/4) clay; common fine yellowish brown (10YR 5/4) and red (2.5YR 4/6) mottles: peds are coated with dark grayish brown (10YR 4/2) coatings; strong medium blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots between peds; many thick clay films; few fine siliceous pebbles; slightly acid; gradual boundary.

B22t—25 to 38 inches, coarsely mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) clay; common medium faint yellowish brown (10YR 5/4) and a few fine distinct strong brown (7.5YR 5/6) mottles; moderate to strong medium and coarse blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; many thick clay films; slightly acid; gradual boundary.

B23t—38 to 51 inches, mottled brown (10YR 5/3), light yellowish brown (10YR 6/4), light gray (10YR 7/2), and red sandy clay; weak coarse blocky structure; very hard, very firm, sticky; mildly alkaline; gradual wavy boundary.

B3—51 to 57 inches, distinctly and coarsely mottled light gray (10YR 7/2) and yellowish red (5YR 5/6) sandy clay loam; massive; hard, firm, slightly sticky; few thin clay films; mildly alkaline; gradual boundary.

C—57 to 84 inches, reddish yellow (7.5YR 6/6) loam, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, friable; calcareous; moderately alkaline.

The solum is 40 to 60 inches thick. The A horizon is 4 to 12 inches thick. It is brown, grayish brown, or dark grayish brown. Reaction ranges from medium acid through neutral.

The B2t horizon ranges from 26 to 50 inches in thickness. It is dark grayish brown, grayish brown, brown, light brownish gray, yellow, red, or olive. Mottles are few to common in shades of olive, yellow, red, brown, or gray. The texture is clay loam, clay, or sandy clay; the upper 20 inches is 35 to 50 percent clay. Reaction ranges from slightly acid through mildly alkaline in the upper part of this horizon and from medium acid through mildly alkaline in the lower part.

The B3 horizon is 6 to 16 inches thick. It is light gray, yellowish red, or light olive brown. Mottles range from none to common in shades of yellow, red, brown, or gray. The texture ranges from sandy clay loam to clay. Reaction ranges from slightly acid to mildly alkaline.

The C horizon is 40 to 60 inches below the surface. It is reddish yellow, reddish brown, or brownish yellow. The texture is loam to sandy clay. Reaction ranges from very slightly acid to moderately alkaline. The content of calcium carbonate concretions ranges from 0 to 10 percent.

CrA—Crockett fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from about 10 to 150 acres in size and are oval to irregular in shape. The surface layer is grayish brown fine sandy loam about 11 inches thick. Below this is about 7 inches of dark grayish brown clay having a few reddish brown mottles, 17 inches of light brownish gray clay mottled with yellowish brown, and 14 inches of grayish brown clay. The underlying material to a depth of 62 inches is reddish yellow clay.

Included in some mapped areas of this soil are oval to narrow areas of Mabank soils less than 4 acres in size and a few, small, oval-shaped areas of Cuero soils. Included soils make up less than 15 percent of any one mapped area.

This Crockett soil is best suited to range. Most areas are used for grazing livestock. Several are cropped. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIIs–2; Claypan Prairie (BL) range site; pasture and hayland group 8A.

CrB—Crockett fine sandy loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas are about 12 to 180 acres or more in size and are long to irregular in shape. This soil has the profile described as representative of the series.

Included in some mapped areas of this soil are 2- to 3-acre areas of Mabank soils and a few areas, less than 1 acre each, of Cuero soils. Included soils make up less than 12 percent of any one mapped area.

This Crockett soil is not well suited to crops. Only a few small areas are cropped. Most areas are used for range. Some are in improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIIe–1; Claypan Prairie (BL) range site; pasture and hayland group 8A.

CrC—Crockett fine sandy loam, 3 to 5 percent slopes. This gently sloping soil is on uplands. The areas range from 10 to 100 acres in size, but are dominantly about 30 acres. They are irregular in shape. The surface layer is brown fine sandy loam about 4 inches thick. Below this is about 5 inches of dark grayish brown fine sandy loam, 8 inches of dark grayish brown clay mottled with red and dark yellowish brown, about 24 inches of grayish brown clay mottled with strong brown, and about 8 inches of light brownish clay. The next layer to a depth of 78 inches is reddish yellow clay loam.

This soil is used mostly for range. It is not well suited to crops, but a few areas are cultivated. Soil blowing is a slight hazard, and water erosion a severe hazard. A few areas are in improved pasture. Capability unit IVe–1; Claypan Prairie (BL) range site; pasture and hayland group 8A.

CsC2—Crockett soils, 2 to 5 percent slopes, eroded. These gently sloping soils are on uplands. Areas are irregular in shape. They average about 75 acres in size, but some are as large as 700 acres. The original fine sandy loam surface layer has been thinned by erosion, and in places more than half of it has been removed. In some places all of the original layer has been removed and the present layer is clay loam or clay. Gullies 5 feet deep and 10 feet wide have formed in some areas.

The surface layer is grayish brown fine sandy loam about 7 inches thick. In sequence downward is about 12 inches of brown clay mottled with brownish yellow and red, 13 inches of light brownish gray clay mottled with brownish yellow and light brownish gray, and 15 inches of light olive brown sandy clay mottled with light gray and brownish yellow. Below this to a depth of 60 inches is brownish yellow sandy clay.

Crockett soils are poorly suited to crops. Almost all areas are in range. A few are in improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IVe–5; Claypan Prairie (BL) range site; pasture and hayland group 8A.

Cuero Series

The Cuero series consists of deep, nearly level to gently sloping loamy soils of the uplands. These soils formed in calcareous loamy material that contains thin strata of weakly cemented sandstone.

In a representative profile the surface layer is dark grayish brown sandy clay loam about 8 inches thick. The subsoil is about 20 inches of sandy clay loam. It is very dark grayish brown in the upper 8 inches and brown in the lower 12 inches. The next 35 inches is clay loam. It is reddish brown in the upper part and light brown in the lower part. The underlying material to a depth of 90 inches is pale yellow, weakly cemented, calcareous sandstone.

These soils are well drained and have slow runoff. They are moderately permeable. The available water capacity is high.

These soils are well suited to crops, and a few areas are cropped. Most areas are used for range. A few are in improved pasture.

Representative profile of Cuero sandy clay loam, 0 to 2 percent slopes, 10.6 miles north on U.S. Highway 183 from the intersection of U.S. Highway 183 and U.S. Highway 87 in Cuero; 1.6 miles east on Farm Road 951; 1.5 miles north on a county road; 200 feet east along a field boundary and 50 feet north of field boundary; in range:

A1—0 to 8 inches, very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky; common fine roots; many worm casts; neutral; gradual smooth boundary.

B1t—8 to 16 inches, very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky; common fine roots; many fine pores; few thin clay films; neutral; gradual smooth boundary.

B21t—16 to 22 inches, brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; strong medium subangular blocky structure; hard, firm, sticky; few fine roots; many fine pores; continuous thin clay films; mildly alkaline; gradual smooth boundary.

B22t—22 to 28 inches, brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; strong medium and coarse subangular blocky structure; hard, firm, slightly sticky; few fine roots; continuous thin clay films; mildly alkaline; gradual smooth boundary.

B3ca—28 to 40 inches, reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; strong medium and coarse subangular blocky structure; hard, firm, slightly sticky; few fine roots; few thin clay films; few segregations of calcium carbonate in coatings on surfaces of peds and in fine concretions; calcareous; moderately alkaline; gradual smooth boundary.

Cca—40 to 63 inches, light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, firm, slightly sticky; common threads and concretions of calcium carbonate; few soft sandstone fragments; calcareous; moderately alkaline; diffuse wavy boundary.

C2—63 to 90 inches, pale yellow (2.5Y 8/4) weakly cemented calcareous sandstone containing seams and pockets of calcareous clay loam.

The solum is 30 to 60 inches thick. Depth to segregated calcium carbonate in the form of threads, films, or soft masses ranges from 22 to 36 inches.

The A and B1t horizons are dark gray, very dark gray, grayish brown, dark grayish brown, very dark grayish brown, or dark brown. The B1t horizon is sandy clay loam or clay loam. Reaction is neutral or mildly alkaline.

The B2t horizon is dark grayish brown, brown, reddish brown, or dark reddish brown. It is sandy clay loam or clay loam. The clay content is 25 to 35 percent. Reaction is mildly alkaline or moderately alkaline. The B3ca horizon is reddish brown, dark brown, brown, or light yellowish brown.

The calcium carbonate equivalent of the Cca horizon ranges from 15 to 40 percent. The C horizon ranges from weakly cemented calcareous sandstone to massive calcareous loamy earth.

CuB—Cuero sandy clay loam, 0 to 2 percent slopes. This nearly level to gently sloping soil is on uplands. Areas range from about 8 to 100 acres in size, but are dominantly about 40 acres. They are irregular and long in shape.

Included in some mapped areas of this soil are 1- to 3-acre areas of Sarnosa, Mabank, and Crockett soils. Included soils make up less than 12 percent of any mapped area.

This soil is well suited to crops, and several areas are farmed to crops commonly grown in the county. Most areas are used for range. A few are in improved pasture. The hazards of soil blowing and water erosion are slight. Capability unit IIe–4; Clay Loam range site; pasture and hayland group 7C.

Degola Series

The Degola series consists of deep, nearly level, noncalcareous loamy soils of the bottom land. These soils formed in loamy alluvium.

In a representative profile the surface layer is clay loam about 30 inches thick. The upper 6 inches is dark gray, the next 8 inches is very dark gray, and the lower 16 inches is dark gray. The underlying material to a depth of 70 inches is sandy clay loam. It is gray in the upper part and white in the lower part.

These soils are well drained and have slow runoff. They are moderately permeable, and the available water capacity is high.

Most areas are used for range. Some are in improved pasture, and a few are cropped.

Representative profile of Degola clay loam in an area of Degola soils, frequently flooded, 10 miles northeast on Farm Road 1447 from the intersection of U.S. Highway 183 and Farm Road 1447 in Cuero to a paved county road; then 0.65 mile northwest on a paved county road, 0.15 mile southwest and 0.85 mile northeast on a county road, and 250 feet east-southeast of the gate; in range:

A11—0 to 6 inches, dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; moderate very fine subangular blocky structure; hard, firm, sticky; many fine roots; neutral; clear smooth boundary.

A12—6 to 14 inches, very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; strong medium subangular blocky structure; hard, firm, sticky; common fine roots; neutral; clear smooth boundary.

A13—14 to 30 inches, dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; hard, firm, sticky; few fine roots; neutral; clear smooth boundary.

C1—30 to 36 inches, gray (10YR 5/1) sandy clay loam, dark gray (10YR 4/1) moist; massive; few fine dark brown segregations of iron manganese; neutral; gradual smooth boundary.

C2—36 to 70 inches, white (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; common medium distinct brownish yellow mottles; massive; very hard, firm; few very thin strata of fine sandy loam texture; few to common soft masses of calcium carbonate; few fine siliceous pebbles; mildly alkaline; gradual smooth boundary.

The A11 horizon is 6 to 16 inches thick. It is very dark gray, dark gray, gray, dark grayish brown, or grayish brown. The texture is loam or clay loam.

The A12 horizon is 0 to 20 inches thick. It is very dark gray, dark gray, gray, very dark grayish brown, dark grayish brown, or grayish brown. The texture is sandy clay loam or clay loam. The clay content of the 10- to 40-inch control section is 22 to 35 percent.

The C horizon is 30 to 50 inches below the surface. It is gray, very pale brown, or white.

De—Degola clay loam, occasionally flooded. This nearly level soil occurs as long and irregular areas on bottom land along creeks. Areas range from 12 to 150 acres or more in size, but dominantly are about 50 acres. Slopes are 0 to 1 percent. Flooding occurs once or more in 4 to 10 years during the period April to June.

The surface layer is dark grayish brown clay loam about 32 inches thick. The underlying material to a depth of about 72 inches is gray clay loam.

Included in some mapped areas of this soil are small areas of Meguin, Trinity, and Zalla soils. Also included are small areas where the surface layer is less than 20 inches thick and areas where it is fine sandy loam. Included areas make up less than 15 percent of any one mapped area.

This Degola soil is well suited to crops, and about one-third of the acreage is cropped. Most areas are in range. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIw–2; Loamy Bottomland range site; pasture and hayland group 1C.

Dg—Degola soils, frequently flooded. These nearly level soils occur as long, irregular areas along the flood plains of creeks. They have the profile described as representative of the series. The surface layer is clay or clay loam. Areas range from 15 to 200 acres or more in size, but are dominantly about 50 acres. Slopes are 0 to 1 percent. These soils are flooded one or more times in 1 to 4 years.

Included in some mapped areas of this soil are 1- to 6-acre areas of Meguin and Trinity soils. Also included are small areas where the surface layer is less than 20 inches thick. Included soils make up less than 12 percent of any mapped area.

Degola soils are not farmed because flooding is a hazard. Most of the acreage is used as range. A few areas are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit Vw–1; Loamy Bottomland range site; pasture and hayland group 1C.

Denhawken Series

The Denhawken series consists of deep, nearly level to gently sloping, calcareous loamy soils of the uplands. These soils formed in calcareous clayey marine shale.

In a representative profile the surface layer is grayish brown clay loam about 6 inches thick. The next 44 inches is light brownish gray clay loam. The underlying material to a depth of 82 inches is pink clay loam.

These soils are well drained and very slowly permeable. Runoff is slow, and the available water capacity is high.

These soils are used mostly as range. They are suited to crops, and a small acreage is cropped. A few areas are in improved pasture.

Representative profile of Denhawken clay loam, in an area of Denhawken-Elmendorf complex, 0 to 3 percent slopes, 11 miles south of U.S. Highway 183 from the intersection of U.S. Highways 87 and 183 in Cuero; then 0.6 mile northwest on a county road, 1,750 feet north on a private road, and 100 feet east-southeast; in range:

A1—0 to 6 inches, grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; hard, friable; common fine roots; few fine siliceous pebbles; calcareous; moderately alkaline; gradual wavy boundary.

B21—6 to 28 inches, light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; moderate medium and fine angular blocky structure; very hard, very firm; common fine roots; evident pressure faces; few fine calcium carbonate concretions;

calcareous; moderately alkaline; gradual wavy boundary.

B22ca—28 to 50 inches, light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium and fine angular blocky structure; very hard, very firm; few fine roots; evident pressure faces; about 8 percent soft masses of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

Cca—50 to 82 inches, pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; massive; very hard, very firm; few fine ferromanganese concretions; common fine calcium carbonate concretions; calcareous; moderately alkaline.

The A1 horizon is 5 to 10 inches thick. It is grayish brown, brown, or pale brown. The texture is clay loam or clay.

The B21 horizon is 6 to 18 inches thick. It is light brownish gray, grayish brown, brown, or pale brown. The texture is clay loam or clay.

The B22ca horizon is 12 to 22 inches thick. It is light brownish gray, grayish brown, brown, or pale brown. Mottling ranges from none to common, medium, yellowish brown to pink. The texture is clay loam or clay.

The Cca horizon is 40 to 64 inches below the surface. It is light reddish brown, reddish brown, pink, or light brown. The content of soft masses of calcium carbonate ranges from a few to as much as 40 percent by volume.

DuB—Denhawken-Elmendorf complex, 0 to 3 percent slopes. This nearly level to gently sloping mapping unit is on uplands. It is about 60 percent Denhawken soils, 34 percent Elmendorf soil, and 6 percent Crockett, Miguel, and Wilson soils. Areas are irregular in shape and about 8 to 300 acres in size. The Denhawken soil is on microhighs about 2 to 8 inches higher than the adjoining microdepressions. The Elmendorf soil is in the microdepressions.

Included in mapped areas of these soils are oval-shaped areas, 6 to 14 acres in size, where the slope is about 4 percent. Included areas make up less than 15 percent of any one mapped area.

These soils are suited to crops. Only a few areas are cropped. A few are in improved pasture. Most are used as range. The hazards of soil blowing and water erosion are slight. Capability unit IIIe–4; Blackland range site; pasture and hayland group 7A.

Edna Series

The Edna series consists of deep, nearly level, noncalcareous loamy soils of the uplands. These soils formed in loamy to clayey unconsolidated sediments on marine terraces.

In a representative profile the surface layer is gray fine sandy loam about 7 inches thick. The next 27 inches is gray clay. The next 50 inches is light gray sandy clay loam.

These soils are poorly drained and have very slow runoff. They are very slowly permeable, and the available water capacity is high.

Most areas are used for range.

Representative profile of Edna fine sandy loam, 0 to 1 percent slopes, 11 miles southeast on U.S. Highway 87 to Thomaston from the intersection of U.S. Highways 183 and 87 in Cuero; 9 miles northeast on county road to a cattle guard; 0.25 mile northwest on a private road in the Gohlke oilfield; 1.2 miles southwest on oilfield road; 0.45 mile north-northwest on an oilfield road to a point 275 feet south of a "T" road intersection. This point is 120 feet north of a low ponded area and 85 feet west of the private road:

A1—0 to 7 inches, gray (10YR 6/1) fine sandy loam, gray (10YR 5/1) moist; weak granular structure; massive; extremely hard, very friable; common fine roots; slightly acid; abrupt wavy boundary.

B21tg—7 to 20 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate coarse blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; common clay films; few fine siliceous pebbles; slightly acid; gradual wavy boundary.

B22tg—20 to 34 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist, common medium distinct light gray (5Y 6/1) mottles, gray (5Y 5/1) moist; weak medium blocky structure; few fine roots between peds; few clay films; neutral; gradual wavy boundary.

B31g—34 to 72 inches, light gray (2.5Y 7/2) sandy clay loam, light gray (2.5Y 6/2) moist; few medium distinct yellowish brown mottles; weak medium and coarse blocky structure; very hard, firm, slightly sticky and plastic; common medium ferromanganese concretions; mildly alkaline; gradual wavy boundary.

B32g—72 to 84 inches, light gray (2.5Y 7/2) sandy clay loam, light brownish gray (2.5Y 6/2) moist; common medium distinct yellow (10YR 7/8) mottles; weak medium and coarse blocky structure; very hard, firm, slightly sticky; common medium ferromanganese concretions; mildly alkaline.

The solum is 60 to 100 inches thick. The A horizon is 5 to 10 inches thick. It is gray, dark gray, or light gray. Reaction ranges from medium acid to neutral.

The B2tg horizon is 24 to 40 inches thick. It is gray, light gray, or dark gray. Mottles are few to common in shades of yellow, brown, olive, light gray, or gray. The texture ranges from clay to sandy clay. Reaction is from medium acid to neutral.

The B3g horizon is 24 to 60 inches thick. It is gray, light gray or light yellowish brown mottled with yellow, brown, or olive. The texture ranges from sandy clay to clay loam. Reaction ranges from neutral through moderately alkaline.

EdA—Edna fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 15 to 80 acres in size, but dominantly are about 25 acres. They are oval in shape. Surfaces are concave and slopes are dominantly less than 0.5 percent.

Included in some mapped areas of this soil are a few 1- to 2-acre mounds of Fordtran soils. small low spots of Wilson soils, and a few areas of Edna soils where slopes are up to 2 percent. Included soils make up as much as 12 percent of some mapped areas.

This soil is poorly suited to crops. It is used as native range. The hazards of soil blowing and water erosion are slight. Capability unit IIIw–1; Claypan Prairie (CO) range site; pasture and hayland group 8A.

Ellen Series

The Ellen series consists of deep, gently sloping to sloping, noncalcareous gravelly sandy soils of the uplands. These soils formed in ancient stream terrace or delta deposits of sand and gravel.

In a representative profile the surface layer is pale brown gravelly loamy sand about 8 inches thick. Below this is about 20 inches of very pale brown very gravelly loamy sand, 24 inches of white very gravelly sandy clay loam mottled with dark red, and 24 inches of white gravelly sandy clay loam mottled with light brownish gray and dark red. The underlying material to a depth

of 84 inches is white gravelly sandy clay loam mottled with light gray and red.

These soils are moderately well drained and have slow runoff. Permeability is moderately slow, and the available water capacity is very low.

Nearly all the acreage is range. Some areas have been mined for gravel.

The Ellen soils in De Witt County are mapped only with Silvern soils.

Representative profile of Ellen gravelly loamy sand in an area of Silvern-Ellen complex, 1 to 8 percent slopes, 4.8 miles southeast on U.S. Highway 87 from the intersection of U.S. Highways 87 and 77A in Cuero to its intersection with a county road; then 2.8 miles northeast on a county road, 0.9 mile southeast on a private road, 0.4 mile south and southwest on a private road to a gravel pit entrance, and 400 feet southwest; in range:

A1—0 to 8 inches, pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 5/3) moist; weak very fine granular structure; soft, very friable; common fine roots; 35 percent rounded siliceous pebbles; medium acid; clear smooth boundary.

A2—8 to 28 inches, very pale brown (10YR 8/4) very gravelly loamy sand, very pale brown (10YR 7/4) moist; weak very fine granular structure; soft, very friable; few fine roots; 52 percent rounded siliceous pebbles; medium acid; clear wavy boundary.

B21t—28 to 52 inches, white (10YR 8/1) very gravelly sandy clay loam, light gray (10YR 7/1) moist; common medium and coarse prominent dark red (10R 3/6) mottles; weak fine and very fine subangular blocky structure; hard, firm, sticky, slightly plastic; few fine roots; few pores; about 5 percent plinthite that occurs in the red mottled areas; thin clay films on sand grains and in pores; 51 percent rounded siliceous pebbles mostly 1 to 3 inches in diameter; extremely acid; gradual wavy boundary.

B22t—52 to 76 inches, white (10YR 8/2) gravelly sandy clay loam, light gray (10YR 7/2) moist; many coarse prominent light brownish gray (10YR 6/2) and dark red (10R 3/6) mottles; moderate fine and very fine subangular blocky structure; hard, firm, sticky, slightly plastic; distinct thin clay films; 40 percent rounded siliceous pebbles and 10 percent cobbles; very strongly acid; gradual wavy boundary.

C—76 to 84 inches, white (10YR 8/1) gravelly sandy clay loam, light gray (10YR 7/1) moist; common medium and coarse prominent red (2.5YR 4/8) mottles; massive; hard, firm, slightly sticky; 38 percent rounded siliceous pebbles mostly less than 1 inch in diameter; strongly acid.

The solum is 60 to 80 inches thick. The A horizon is 20 to 40 inches thick. The A1 horizon is pale brown or light brown. The A2 horizon is very pale brown, light brown, or pink. The content of gravel ranges from 35 to 60 percent in the upper 8 inches and from 50 to 80 percent in the lower part. Reaction is medium acid or slightly acid.

The Bt horizon is 25 to 55 inches thick. It is white or light gray. Mottles are many, coarse, and prominent in shades of red, brown, or gray. The content of gravel ranges from 50 to 80 percent in the upper part of the Bt horizon and from 35 to 65 percent in the lower part. Reaction is extremely acid or very strongly acid in the upper part and very strongly acid or strongly acid in the lower part.

Elmendorf Series

The Elmendorf series consists of deep, noncalcareous, nearly level to gently sloping loamy soils of the uplands. These soils formed in calcareous clayey marine shale.

In a representative profile the surface layer is dark gray clay loam about 10 inches thick. Below this is about 6 inches of very dark gray clay loam, 14 inches of dark gray clay loam, 10 inches of gray clay loam, and 40 inches of pale brown to very pale brown clay loam.

These soils are well drained and have slow runoff. Permeability is very slow, and the available water capacity is high.

These soils are suited to crops, and a few areas are cropped. Most areas are used for range. A few are in improved pasture.

The Elmendorf soils in De Witt County are mapped only with Denhawken soils.

A representative profile of Elmendorf clay loam in an area of Denhawken-Elmendorf complex, 0 to 3 percent slopes, 11 miles south on U.S. Highway 183 from the intersection of U.S. Highways 183 and 87 in Cuero; then 0.6 mile northwest on a county road to a gate, and 1,750 feet north on a private road and 100 feet southeast; in range:

A1—0 to 10 inches, dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak very fine subangular blocky structure; hard, friable; common fine roots; neutral; clear wavy boundary.

B1t—10 to 16 inches, very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium and fine angular blocky structure; hard, firm, sticky; few thin clay films; common fine roots; neutral; diffuse wavy boundary.

B21t—16 to 30 inches, dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist, moderate medium angular blocky structure; very hard, very firm, sticky; few fine roots; common thick clay films; evident pressure faces; mildly alkaline; gradual wavy boundary.

B22tca—30 to 40 inches, gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; moderate medium angular blocky structure; very hard, very firm, sticky; few fine roots; common clay films; evident pressure faces; about 6 percent calcium carbonate concretions; calcareous; moderately alkaline; clear wavy boundary.

B31t—40 to 58 inches, pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium angular blocky structure; extremely hard, very firm, sticky; few clay films; few pressure faces; about 3 percent fine calcium carbonate concretions and soft masses of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

B32t—58 to 80 inches, very pale brown (10YR 7/4) clay loam, light yellowish brown (10YR 6/4) moist; common medium distinct light gray (10YR 7/2) and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium angular blocky structure; extremely hard, very firm, slightly sticky; few fine calcium carbonate concretions; calcareous; moderately alkaline.

The solum is 60 to 90 inches thick. Depth to secondary carbonates ranges from 28 to 54 inches.

The A and B1t horizons are black, dark gray, very dark gray, very dark grayish brown, or dark grayish brown. The texture of the A horizon is loam or clay loam. Reaction of the A and upper Bt horizons is neutral through moderately alkaline.

Texture of the B1t horizon is clay or clay loam. Clay content of the upper 20 inches of the Bt horizon is 35 to 50 percent. The B2t horizon and the B3t horizon are pale brown, very pale brown, pale yellow, gray, dark gray, yellow, yellowish brown, brown, light yellowish brown, pink, or light brown. Mottles are in shades of brown, yellow, olive, gray, or red. Texture is clay loam or clay. Clay content ranges from 30 to 40 percent. Visible calcium carbonate in the form of films and threads, soft masses, or cemented nodular concretions ranges from 2 to 10 percent.

The C horizon is grayish and yellowish marine shale that is 1 to 25 percent selenite crystals.

Ferris Series

The Ferris series consists of deep, gently sloping, calcareous clayey soils of the uplands. These soils formed in calcareous clayey marine sediments.

In a representative profile the surface layer is grayish brown clay about 8 inches thick. The next 40 inches is light yellowish brown clay. The underlying material to a depth of 62 inches is light yellowish brown clay.

These soils are well drained and have rapid runoff. Permeability is very slow, and the available water capacity is high.

Most of the acreage is used for range. Several areas are in improved pasture. A few of the less sloping areas are farmed.

Representative profile of Ferris clay in an area of Ferris soils, 3 to 5 percent slopes, eroded, 12.5 miles northeast on U.S. Highway 77A from the intersection of U.S. Highways 87 and 77A in Cuero; then 0.3 mile south on a county road, 0.5 mile east on a county road, and 300 feet north of the road; in range:

A—0 to 8 inches, grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; weak medium and fine angular blocky structure; extremely hard, very firm, very sticky and very plastic; many roots; few fine calcium carbonate concretions and few powdery masses of calcium carbonates; calcareous; moderately alkaline; gradual wavy boundary.

AC—8 to 48 inches, light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; moderate fine angular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; common coarse intersecting slickensides below 22 inches; few fine calcium carbonate concretions; calcareous; moderately alkaline; diffuse wavy boundary.

C—48 to 62 inches, light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; massive; extremely hard, very firm; few coarse slickensides; few fine masses and concretions of calcium carbonate; calcareous; moderately alkaline.

The solum is 30 to 62 inches thick. The A horizon is 5 to 12 inches thick. It is grayish brown, light brownish gray, dark grayish brown, brown, light yellowish brown, light olive brown, or olive brown.

The AC horizon is 24 to 48 inches thick. It is yellowish brown, light yellowish brown, olive yellow, light olive brown, or pale olive. Mottling ranges from few to common in shades of gray, brown, or yellow.

The C horizon is the same color as the AC horizon. It ranges from clay to shaly clay.

FeC2—Ferris soils, 3 to 5 percent slopes, eroded. This gently sloping unit is on uplands. It is above Wilson, Mabank, and Crockett soils and below or near Houston Black, Sarnosa, and Shiner soils. Areas are irregular and long in shape and range from 8 to 60 acres in size. A few broad, shallow gullies have formed, but most can be crossed by farm machinery. In a few places erosion has exposed the lower layers of soil material.

Included in some mapped areas of these soils are galled spots, rills, and gullies. Also included are small areas of Heiden soils where slope is 5 to 8 percent. Included soils make up less than 12 percent of any one mapped area.

Most of the acreage is used as range. Many areas were farmed, but most are now in other uses. Some are in improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IVe–2; Eroded Blackland range site; pasture and hayland group 7A.

Fordtran Series

The Fordtran series consists of deep, nearly level, noncalcareous sandy soils of the uplands. These soils formed in thick beds of unconsolidated clayey and loamy sediments.

In a representative profile the surface layer is light brownish gray loamy fine sand about 16 inches thick. Next is about 12 inches of light gray loamy fine sand, 30 inches of white sandy clay mottled with strong brown and dark red in the upper 8 inches and with reddish yellow and yellowish brown in the lower 12 inches, and 10 inches of white sandy clay loam mottled with brownish yellow and red. The underlying material to a depth of 72 inches is mottled light gray, red, and reddish yellow sandy clay loam.

These soils are somewhat poorly drained. They are very slowly permeable and have slow runoff. The available water capacity is high.

These soils are used for range.

Representative profile of Fordtran loamy fine sand, 0 to 1 percent slopes, 11 miles southeast on U.S. Highway 87 to Thomaston from the intersection of U.S. Highways 87 and 183 in Cuero; then 4 miles northeast of Thomaston on a county road, 3 miles north on a county road, and 260 feet east of road; in range:

A1—0 to 16 inches, light brownish gray (10YR 6/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak granular structure; slightly hard, very friable; many fine roots; 3 percent rounded siliceous pebbles; common worm casts; slightly acid; clear smooth boundary.

A2g—16 to 28 inches, light gray (10YR 7/2) loamy fine sand, light brownish gray (10YR 6/2) moist; single grained; soft, loose; common fine roots; few worm casts; slightly acid; abrupt wavy boundary.

B21tg—28 to 36 inches, white (10YR 8/2) sandy clay, light gray (10YR 7/2) moist; many medium to coarse distinct strong brown (7.5YR 5/8) and common medium prominent dark red (10R 3/6) mottles; moderate medium blocky structure; extremely hard, very firm, few fine roots; common clay films on ped surfaces; few fine siliceous pebbles; slightly acid; gradual wavy boundary.

B22tg—36 to 48 inches, white (10YR 8/1) sandy clay, light gray (10YR 7/1) moist; many medium distinct yellowish brown (10YR 5/8) and reddish yellow (7.5YR 6/8) mottles; moderate blocky structure; extremely hard, very firm; few fine roots; common clay films on surfaces of peds; few weakly cemented iron-manganese concretions; neutral; gradual wavy boundary.

B3g—48 to 58 inches, white (10YR 8/1) sandy clay loam, light gray (10YR 7/1) moist; many medium and coarse prominent brownish yellow (10YR 6/6) and red (10R 4/6) mottles; weak coarse angular blocky structure; extremely hard, firm; thin clay films; few weakly cemented iron-manganese concretions; mildly alkaline; gradual wavy boundary.

C—58 to 72 inches, mottled light gray (10YR 7/1), red (10R 4/6), and reddish yellow (7.5YR 7/6) sandy clay loam, massive; common siliceous pebbles; calcareous; moderately alkaline.

The solum is 50 to 90 inches thick. The A horizon is 20 to 40 inches thick. It is light gray, gray, dark gray, light brownish gray, grayish brown, pale brown, or brown. Reaction ranges from slightly acid through strongly acid.

The Bt horizon is dark gray, light gray, white, light brownish gray, grayish brown, or dark grayish brown. Mottles are common to many in shades of yellow, red, or brown. The texture is clay, sandy clay, or clay loam. The clay content in the upper 20 inches of the Bt horizon ranges from 35 to 50 percent. Reaction ranges from slightly acid through strongly acid in the upper and middle parts of the Bt horizon and from slightly acid through mildly alkaline in the lower part.

The C horizon ranges from fine sandy loam to clay. Reaction ranges from slightly acid through moderately alkaline.

FoA—Fordtran loamy fine sand, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 50 to 800 acres or more in size. They are broad and irregular. Excess water is in the surface layer during some periods.

Included in some mapped areas of this soil are areas of Fordtran loamy fine sand where slopes are 1 to 2 percent and a few small areas of soils that are similar but have a surface layer 10 to 20 inches thick. Included soils make up less than 10 percent of any mapped area.

This soil is used as range. It is poorly suited to crops. Soil blowing and water erosion are slight hazards. Capability unit IIIw–2; Sandy Prairie range site; pasture and hayland group 9A.

Garcitas Series

The Garcitas series consists of deep, nearly level to gently sloping, noncalcareous gravelly sandy soils of the uplands. These soils formed in interbedded loamy to clayey deposits.

In a representative profile the surface layer is pale brown gravelly loamy fine sand about 7 inches thick. Next is about 17 inches of very pale brown very gravelly loamy fine sand. The subsoil is white gravelly clay mottled with red and reddish yellow in the upper 12 inches, white gravelly clay mottled with red and light red in the next 22 inches, and white clay loam mottled with reddish yellow and red in the lower 8 inches. The underlying material to a depth of 84 inches is white, mottled clay loam in the upper part and sandy clay loam in the lower part.

Garcitas soils are somewhat poorly drained and have slow runoff. Permeability is very slow. The available water capacity is low.

Most of the acreage is range. A small acreage is in improved pasture.

Representative profile of Garcitas gravelly loamy fine sand, 0 to 3 percent slopes, 11 miles southeast on U.S. Highway 87 from its intersection with U.S. Highway 183 in Cuero to its intersection with a county road at Thomaston, 7.5 miles northeast on county road, to a cattle guard at a turn in the county road, 0.1 mile north on private oilfield road, 0.5 mile east of private road, 0.7 mile north on private road to an oil well on the right, and 20 feet west of the road; in range:

A1—0 to 7 inches, pale brown (10YR 6/3) gravelly loamy fine sand, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, very friable; many fine roots; about 15 percent siliceous pebbles; slightly acid; clear smooth boundary.

A2—7 to 24 inches, very pale brown (10YR 7/4) very gravelly loamy fine sand, light yellowish brown (10YR 6/4) moist; single grained; loose; common fine roots; about 80 percent siliceous pebbles; slightly acid; abrupt wavy boundary.

B21tg—24 to 36 inches, white (10YR 8/2) gravelly clay, light gray (10YR 7/2) moist; common medium prominent red (10R 3/6) and reddish yellow (5YR 6/8) mottles; weak medium angular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; prominent clay films on faces of peds and in pores; about 25 percent siliceous pebbles; strongly acid; gradual wavy boundary.

B22tg—36 to 58 inches, white (10YR 8/2) gravelly clay, light gray (10YR 7/2) moist; common coarse prominent red (10R 4/6) and few medium light red (2.5YR 6/8) mottles; moderate medium angular blocky structure; extremely hard, very firm, sticky and plastic; thin clay films on faces of peds and in pores; about 15 percent siliceous pebbles; extremely acid; gradual smooth boundary.

B3t—58 to 66 inches, white (10YR 8/2) clay loam, light gray (10YR 7/2) moist; common coarse distinct reddish yellow (7.5YR 7/6) and few medium distinct red (2.5YR 5/8) mottles; weak coarse angular blocky structure; extremely hard, very firm, slightly sticky; few thin clay films; about 8 percent siliceous pebbles; very strongly acid; gradual smooth boundary.

C1—66 to 78 inches, white (10YR 8/2) clay loam, light gray (10YR 7/2) moist; common medium faint yellow (2.5Y 8/8) mottles; massive; very hard, firm, slightly sticky; few siliceous pebbles; very strongly acid; gradual smooth boundary.

C2—78 to 84 inches, white (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; common coarse distinct light red (2.5YR 6/8) and red (10R 4/6) mottles; massive; very hard, firm, slightly sticky; few siliceous pebbles; very strongly acid.

The solum is 50 to 72 inches thick. The A1 horizon is light brownish gray, light gray, pale brown, or very pale brown. The A2 horizon is light gray or very pale brown. Reaction is slightly acid or medium acid. Coarse fragments are mostly siliceous pebbles and cobbles and range from 15 to 80 percent.

The B2tg horizon is light gray, light brownish gray, or white mottled in shades of red, yellow, and brown. It is gravelly clay or gravelly sandy clay. The content of siliceous pebbles ranges from about 15 to 35 percent. Reaction is medium acid through extremely acid.

The B3t horizon is clay loam or sandy clay. Reaction is slightly acid through very strongly acid. The C horizon is mostly mottled loamy earth. Reaction ranges from slightly acid through very strongly acid.

GaB—Garcitas gravelly loamy fine sand, 0 to 3 percent slopes. This nearly level to gently sloping soil is on uplands. Areas are irregular in shape and range from about 40 to 400 acres in size. More than 50 to 60 percent of the mapped areas is the Garcitas soil, and 20 to 40 percent is a soil similar to the Garcitas soil.

Included in some mapped areas of this soil are 1- to 5-acre areas of Fordtran and Edna soils. The Fordtran and Edna soils make up less than 8 percent of any mapped area.

This Garcitas soil is poorly suited to crops. It is suited to range or improved pasture. Most areas are used for range. Soil blowing and water erosion are slight hazards. A few small areas are mined for gravel. Capability unit IVs–2; Sandy Prairie range site; pasture and hayland group 9A.

Goldmire Series

The Goldmire series consists of deep, gently sloping to sloping, noncalcareous very gravelly sandy soils of the uplands. These soils formed in ancient stream terraces or in delta deposits of sand and gravel.

In a representative profile the surface layer is very pale brown very gravelly loamy sand about 3 inches thick. The next 39 inches is white very gravelly sandy

clay loam mottled with dark red and light brownish gray. The underlying material to a depth of 80 inches is white gravelly sandy clay loam mottled with red.

These soils are moderately well drained and have slow runoff. Permeability is moderately slow. The available water capacity is low.

These soils are used for range. Most of the gravelly surfaces have been mined.

Representative profile of Goldmire very gravelly soils, 1 to 8 percent slopes, 4.8 miles southeast on U.S. Highway 87 from the intersection of U.S. Highways 87 and 183 in Cuero to its intersection with a paved county road; then 2.8 miles northeast on a paved county road, and 0.9 mile southeast on a private road to the top of a hill; 0.4 mile south on winding private road to the entrance to a gravel pit, and 390 feet southwest; in an abandoned gravel pit:

Ap—0 to 3 inches, very pale brown (10YR 8/4) very gravelly loamy sand, very pale brown (10YR 7/4) moist; single grained; loose, very friable; common fine roots; 90 percent rounded siliceous pebbles; medium acid; clear wavy boundary.

B21t—3 to 27 inches, white (10YR 8/1) very gravelly sandy clay loam, light gray (10YR 7/1) moist; common medium and coarse prominent dark red (10R 3/6) mottles; weak fine and very fine subangular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots in the upper part; about 5 percent plinthite within the red mottled areas; few thin clay films; 60 percent rounded siliceous pebbles; extremely acid; gradual wavy boundary.

B22t—27 to 42 inches, white (10YR 8/2) very gravelly sandy clay loam, light gray (10YR 7/2) moist; many medium distinct light brownish gray (10YR 6/2) and coarse prominent dark red (10R 3/6) mottles; moderate fine and very fine subangular blocky structure; extremely hard, very firm, sticky and plastic; about 10 percent plinthite within the red mottled areas; patchy clay films; 50 percent rounded siliceous pebbles; very strongly acid; gradual wavy boundary.

B23t—42 to 50 inches, white (10YR 8/1) gravelly sandy clay loam, light gray (10YR 7/1) moist; common medium and coarse distinct red (2.5YR 4/8) mottles; weak medium angular blocky structure; extremely hard, firm, slightly sticky and slightly plastic; about 5 percent plinthite within the red mottled areas; patchy clay films; 40 percent rounded siliceous pebbles; strongly acid; gradual wavy boundary.

B3—50 to 80 inches, white (10YR 8/1) gravelly sandy clay loam; common medium distinct red (2.5YR 5/8) mottles; weak medium subangular blocky structure; very hard, friable; about 5 percent plinthite in mottled red areas; 40 percent rounded siliceous pebbles; strongly acid.

The solum is 60 to 90 inches thick. Siliceous pebbles and cobbles range from 60 to 90 percent in the Ap horizon, from 35 to 70 percent in the upper B2t horizon, and about 15 to 50 percent in the B3t and C horizons.

The Ap horizon is reddish brown, light reddish brown, light brown, strong brown, pale brown, or very pale brown. It is very gravelly loamy sand or very gravelly sand. Reaction is medium acid through very strongly acid.

The Bt horizon is white or light gray. It has common to many mottles in shades of red, yellow, gray, and brown. In some parts it is prominently and coarsely mottled with these colors. The texture of the upper 20 inches of the Bt horizon is gravelly sandy clay loam or very gravelly sandy clay loam. The clay content is 20 to about 30 percent. Reaction is strongly acid through extremely acid. Base saturation ranges from 35 to 65 percent by sum of cations.

In some areas the C horizon is white mottled with red, yellow, and gray. In others it has a mixed mottled matrix of these colors.

GdD—Goldmire very gravelly soils, 1 to 8 percent slopes. These gently sloping soils are on uplands. The areas are within the gravel pits and have been desurfaced for road material. They are oval or irregular in shape and range from 5 to 170 acres or more in size, but are dominantly about 60 acres.

Included in some mapped areas of these soils are small areas of Ellen and Silvern soils and a small acreage of soils that have been mined for caliche. Included soils make up less than 8 percent of any one mapped area.

This mapping unit is poorly suited to crops and improved pasture. It is all used as range. Most areas are reseeding to native grass and are now used as range. Soil blowing and water erosion are slight hazards. Capability unit VIs–2; Gravelly range site.

Heiden Series

The Heiden series consists of deep, gently sloping, calcareous clayey soils of the uplands. These soils formed in calcareous clayey marine sediments.

In a representative profile the surface layer is dark grayish brown clay in the upper 30 inches and grayish brown clay in the lower 12 inches. The next 18 inches is light olive gray clay. The underlying material to a depth of 80 inches is pale olive silty clay.

These soils are well drained and have very slow permeability. Runoff is rapid, and the available water capacity is high.

These soils are used mostly for range. Several areas are in improved pasture. A few are in crops commonly grown in the county.

A representative profile of Heiden clay, 3 to 5 percent slopes, 16 miles northeast on U.S. Highway 77A from the intersection of U.S. Highway 87 and U.S. Highway 77A in Cuero to intersection with Texas Highway 111 in Yoakum, 5.3 miles west on Texas Highway 111, 0.85 mile south on Farm Road 951, 0.1 mile south on a county road, 0.45 mile east on a county road to a gate at a fence corner on the south side of the road, 65 feet south along the fence, 50 feet east of fence; in improved pasture of Coastal bermudagrass:

A11—0 to 30 inches, dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine angular blocky structure; parallelepipeds are about 1 to 3 inches long with axis tilted 10 to 60 degrees from the horizontal and intersecting slickensides in the lower part; very hard, very firm, very sticky and plastic; many fine roots; few worm casts in upper part; few fragments of snail shells; calcareous; moderately alkaline; diffuse wavy boundary.

A12—30 to 42 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium angular blocky structure; parallelepipeds about 1 to 3 inches long with axis tilted 10 to 60 degrees from the horizontal; intersecting slickensides; extremely hard, very firm, very sticky and plastic; few fine roots; few calcium carbonate concretions; calcareous; moderately alkaline; diffuse wavy boundary.

AC—42 to 60 inches, light olive gray (5Y 6/2) clay, olive gray (5Y 5/2) moist; weak coarse angular blocky structure; parallelepipeds about 1 to 3 inches long with axis tilted 10 to 60 degrees from the horizontal; intersecting slickensides; extremely hard, very firm, very sticky and plastic; common calcium carbonate concretions; calcareous; moderately alkaline; diffuse wavy boundary.

C—60 to 80 inches, pale olive (5Y 6/3) silty clay, olive (5Y 5/3) moist; common fine yellow (2.5Y 7/6) mottles; massive; extremely hard, very firm, very sticky and plastic; calcareous; moderately alkaline.

The solum is 40 to 65 inches thick.

The A11 horizon is 12 to 30 inches thick. It is very dark grayish brown, dark grayish brown, grayish brown, or dark gray. The content of gravel ranges from 0 to 6 percent.

The A12 horizon is 0 to 18 inches thick. It is dark grayish brown or grayish brown.

The AC horizon is 18 to 40 inches thick. It is olive, light olive gray, or yellowish brown.

The C horizon ranges from 40 to 65 inches below the surface. The texture is silty clay or clay. The color is olive, pale olive, or olive gray.

HeB—Heiden clay, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas are about 8 to 70 acres or more in size and are irregular in shape. This soil is at higher elevations than Wilson and Crockett soils and is dominantly at lower elevations than Sarnosa soils. In several areas there are few to common fine pebbles on the surface.

The surface layer is very dark grayish brown clay about 6 inches thick. Below this is dark grayish brown sticky clay about 17 inches thick. Next is 17 inches of olive gray clay. The underlying material to a depth of 66 inches is olive clay.

Included in some mapped areas of this soil are 1- to 4-acre areas of Houston Black, Wilson, Sarnosa, and Crockett soils. Also included are small areas of Heiden clay where slope ranges from 3 to 5 percent. Included soils make up less than 12 percent of any mapped area.

This soil is well suited to crops commonly grown in the area. Most areas are in range. Several are in improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIe–1; Blackland range site; pasture and hayland group 7A.

HeC—Heiden clay, 3 to 5 percent slopes. This gently sloping soil is on uplands. Areas range from about 10 to 90 acres or more in size. They are irregular in shape. This soil has the profile described as representative of the Heiden series.

Included in some mapped areas of this soil are 1- to 3-acre areas of Houston Black, Sarnosa, Shiner, and Crockett soils. Included soils make up less than 15 percent of any mapped area.

This soil is suited to crops, and a few areas are farmed. Most areas are in range. Some are in improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IIIe–2; Blackland range site; pasture and hayland group 7A.

Houston Black Series

The Houston Black series consists of deep, nearly level to gently sloping calcareous clayey soils of the uplands. These soils formed in calcareous clay and marl.

In a representative profile the surface layer is clay. It is very dark gray in the upper 6 inches, dark gray in the next 18 inches, and dark gray with few, fine, faint, yellowish brown mottles in the lower 16 inches. Next is 34 inches of grayish brown clay with few, fine, yellowish brown mottles. Below this to a depth of about 86 inches is grayish brown clay with few, fine, yellowish brown mottles.

These soils are moderately well drained and have slow to rapid runoff. Permeability is very slow, and the available water capacity is high.

These soils are used mainly for range. Some areas are in improved pasture. A few are used for crops that are commonly grown in the county.

Representative profile of Houston Black clay, 1 to 3 percent slopes, 16 miles northeast of Cuero on U.S. Highway 77A to its intersection with Texas Highway 111 at the west edge of Yoakum; then 5.3 miles west on Texas Highway 111, 0.7 mile south on Farm Road 951, and 0.2 mile southeast on a county road to the southeast corner of a field at a drain; 175 feet west of drain along the road fence and 35 feet north of fence; in a field:

Ap—0 to 6 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate very fine angular and subangular blocky structure; extremely hard, very firm, very sticky and plastic; common fine roots; few snail shell fragments; shiny ped faces; few fine black weakly cemented ferromanganese concretions; few fine strongly cemented calcium carbonate concretions; calcareous, moderately alkaline; clear smooth boundary.

A12—6 to 24 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate very fine angular and subangular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; few snail fragments; shiny ped faces; few fine black weakly cemented ferromanganese concretions; few fine strongly cemented calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

A13—24 to 40 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few fine faint yellowish brown (10YR 5/4) mottles; weak fine blocky structure; intersecting slickensides that form parallelepipeds; extremely hard, very firm, sticky and plastic; few fine roots; few fine weakly cemented ferromanganese concretions; few fine strongly cemented concretions of calcium carbonate; calcareous; moderately alkaline; clear wavy boundary.

AC1—40 to 74 inches, grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; weak fine blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; shiny ped faces; few fine black weakly cemented ferromanganese concretions; few fine strongly cemented concretions of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

AC2—74 to 86 inches, grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; few fine faint yellowish brown (10YR 5/4) mottles; weak medium and coarse angular blocky structure; few intersecting slickensides that form parallelepipeds; very hard, very firm, very sticky and plastic; few fine weakly cemented ferromanganese concretions; few powdery masses of calcium carbonate; calcareous; moderately alkaline.

The solum is 60 to 100 inches thick.

The Ap and A11 horizons are 6 to 12 inches thick. They are dark gray, black, or very dark gray.

The A12 horizon is 0 to 34 inches thick. It is gray or very very dark gray, or black.

The A13 horizon is 0 to 18 inches thick. It is gray or very dark gray. Mottles range from many to few, fine, faint, yellowish brown.

The AC1 horizon ranges from 14 to 36 inches in thickness. It is grayish brown, gray, or dark grayish brown. Mottles range from none to few, fine, yellowish brown.

The AC2 horizon is grayish brown or light gray. Mottles range from few, fine, faint, yellowish brown to light olive brown to pinkish gray.

HoA—Houston Black clay, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from

about 10 to 300 acres or more in size. They are oval to irregular in shape.

The surface layer is very dark gray clay about 10 inches thick. Below this layer is very dark gray clay about 34 inches thick. The next 12 inches is gray clay. The underlying material to a depth of 65 inches is gray clay.

Included in some mapped areas of this soil are small areas of Heiden soils and some small areas of Houston Black clay where slope is 1½ percent. Included soils make up less than 15 percent of any mapped area.

This Houston Black soil is well suited to crops, but most of it is used for range. Some areas are farmed. Only a few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIw–3; Blackland range site; pasture and hayland group 7A.

HoB—Houston Black clay, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas range from 15 to 400 acres in size, but are dominantly about 70 acres. They are irregular or oval in shape. This soil has the profile described as representative of the Houston Black series.

Included in some mapped areas of this soil are small areas of Heiden, Wilson, Sarnosa, and Cuero soils. Included soils make up less than 12 percent of any mapped area.

This Houston Black soil is well suited to crops, but most of the acreage is used for range. A few areas are farmed. Some are in improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIe–1; Blackland range site; pasture and hayland group 7A.

Leemont Series

The Leemont series consists of deep, gently sloping to sloping calcareous clayey soils of the uplands. These soils formed in calcareous clay.

In a representative profile the surface layer is gray clay in the upper 5 inches and light gray clay in the lower 21 inches. Next is 24 inches of light brownish gray clay. The underlying material to a depth of 80 inches is pink clay.

These soils are moderately well drained and have medium to rapid runoff. Permeability is very slow. The available water capacity is high.

Most areas are used for range. A few are in crops and pasture.

Representative profile of Leemont clay, 3 to 5 percent slopes, 10 miles southwest and northwest on U.S. Highway 87 from the intersection of U.S. Highways 87 and 183 in Cuero; then 4.2 miles west on Farm Road 2542 and 200 feet north of the highway; in range:

A11—0 to 5 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate fine angular blocky structure; very hard, very firm, very sticky, very plastic; common fine roots; calcareous; moderately alkaline; gradual smooth boundary.

A12—5 to 26 inches, light gray (10YR 6/1) clay, gray (10YR 5/1) moist; weak fine and medium angular blocky structure; common parallelepipeds with the long axis tilted 30° to 45° from the horizontal; extremely hard, very firm, very sticky, very plastic; common fine roots; distinct slickensides; shiny grooved pressure faces on surfaces of peds; calcareous; moderately alkaline; diffuse wavy boundary.

AC1—26 to 50 inches, light brownish gray (10YR 6/2) clay, grayish brown (10YR 5/2) moist; weak medium angular blocky structure; common parallelepipeds tilted 30° to 45° from the horizontal; extremely hard, very firm, very sticky, very plastic; common grooved slickensides; common concretions of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

AC2—50 to 60 inches, pink (7.5YR 7/4) clay, light brown (7.5YR 6/4) moist; weak coarse angular blocky structure; common parallelepipeds tilted 30° to 45° from the horizontal; common grooved slickensides; shiny pressure faces on surfaces of peds; few soft masses of calcium carbonate; common fine concretions of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

C—60 to 80 inches, pink (7.5YR 7/4) clay, light brown (7.5YR 6/4) moist; common medium prominent white (10YR 8/1) mottles; massive, but has vertical and horizontal fractures along apparent bedding planes; very hard, firm, very sticky, very plastic; about 8 percent soft masses of calcium carbonate; calcareous; moderately alkaline.

The solum is 44 to 69 inches thick. Gilgai relief, a series of microridges and microvalleys about 5 to 16 feet wide, is typical in virgin areas.

The A horizon is light gray, gray, or dark gray. It is mildly or moderately alkaline.

The AC horizon is light gray, gray, light brownish gray, grayish brown, pale brown, brown, or pink. Calcium carbonate concretions in the AC horizon range from few to common.

The C horizon is pink, light brown, very pale brown, pale brown, light gray, or pale yellow. In some profiles it is mottled with these colors.

LeC—Leemont clay, 3 to 5 percent slopes. This gently sloping soil is on uplands. Areas range from 7 to 130 acres or more in size. They are irregular in shape. This soil has the profile described as representative of the series.

Included in some mapped areas of this soil are small areas of Sarnosa, Shiner, and Runge soils. Included soils make up less than 12 percent of any mapped area.

This Leemont soil is suited to crops if protected from erosion, and a few areas are cropped. Most are in range. A few are in improved pasture. Soil blowing is a slight hazard and water erosion a moderate hazard. Capability unit IIIe–3; Blackland range site; pasture and hayland group 7A.

LeD—Leemont clay, 5 to 8 percent slopes. This sloping soil in on uplands. Areas are irregular in shape and range from 6 to 80 acres or more in size.

The surface layer is gray clay about 22 inches thick. The next layer is light gray clay about 24 inches thick. The underlying material below a depth of about 46 inches is mottled very pale brown and pale yellow clay.

Included in some mapped areas of this soil are 1- to 3-acre areas of Sarnosa and Shiner soils. Included soils make up less than 12 percent of any mapped area.

This Leemont soil is poorly suited to crops. Soil blowing is a slight hazard, but water erosion is a severe hazard. Nearly all the acreage is used as range. A few areas are in improved pasture. Capability unit IVe–2; Blackland range site; pasture and hayland group 7B.

Leming Series

The Leming series consists of deep, nearly level to gently sloping, noncalcareous sandy soils of the uplands. These soils formed in ancient alluvium that is interbedded with shale and weakly consolidated sandstone.

In a representative profile the surface layer is pale brown loamy fine sand about 12 inches thick. Below this is 14 inches of very pale brown loamy fine sand. The subsoil is about 42 inches thick. In sequence downward, it is 9 inches of light brownish gray sandy clay mottled with yellowish brown and red, 15 inches of light gray sandy clay mottled with yellowish brown and dark red, 8 inches of reddish yellow sandy clay, and 10 inches of very pale brown firm sandy clay loam. The underlying material to a depth of 84 inches is very pale brown loamy fine sand and weakly cemented sandstone.

These soils are moderately well drained and have slow to medium runoff. Permeability is slow, and the available water capacity is medium.

These soils are not well suited to crops. Most areas are used for range. A few are cropped, and a few are in improved pasture.

Representative profile of Leming loamy fine sand, 0 to 5 percent slopes, 13 miles south of Cuero on U.S. Highway 183 to the intersection with Farm Road 237; 4.5 miles northwest on Farm Road 237; 0.75 mile northeast on county road to a gate; 0.25 mile east on private road; 60 feet north of road; in range:

A1—0 to 12 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose, very friable; common fine roots; slightly acid; gradual wavy boundary.

A2—12 to 26 inches, very pale brown (10YR 7/4) loamy fine sand, light yellowish brown (10YR 6/4) moist; single grained; loose, very friable; few fine roots; slightly acid, abrupt wavy boundary.

B21t—26 to 35 inches, mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and red (2.5YR 4/6) sandy clay; weak medium angular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; continuous clay films; slightly acid; gradual wavy boundary.

B22t—35 to 50 inches, mottled light gray (10YR 7/2), yellowish brown (10YR 5/6), and dark red (2.5YR 3/6) sandy clay; weak medium to coarse angular blocky structure; extremely hard, very firm, slightly sticky and plastic; few fine siliceous pebbles; continuous clay films; neutral; gradual wavy boundary.

B31—50 to 58 inches, reddish yellow (5YR 6/6) sandy clay, yellowish red (5YR 5/6) moist; weak angular blocky structure; very hard, firm; few siliceous pebbles; few thin clay films; mildly alkaline; gradual wavy boundary.

B32ca—58 to 68 inches, very pale brown (10YR 8/4) sandy clay loam, very pale brown (10YR 7/4) moist; weak coarse blocky structure; very hard, firm; few clay films; 30 to 50 percent soft masses and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; abrupt wavy boundary.

C—68 to 84 inches, very pale brown (10YR 7/4) loamy fine sand, light yellowish brown (10YR 6/4) moist; thin strata of weakly cemented calcareous sandstone; massive; hard, very friable; calcareous; moderately alkaline.

The solum is 50 to 72 inches thick.

The A1 horizon is 10 to 30 inches thick and is grayish brown, pale brown, light brownish gray, or brown. Reaction ranges from slightly acid to neutral.

The A2 horizon is 4 to 18 inches thick and is light brownish gray, pale brown, light gray, or very pale brown. Reaction ranges from slightly acid to neutral.

The B21t horizon is 6 to 12 inches thick. It is light brownish gray, grayish brown, or light gray. Mottling is in shades of red, brown, yellow, or gray. The texture ranges from sandy clay to clay. Reaction is slightly acid or neutral.

The B22t horizon is 8 to 18 inches thick. It is gray, light gray, or light yellowish brown. Mottling is in shades of red, brown, yellow, or gray. The texture ranges from sandy clay to clay. Reaction is slightly acid or neutral.

The B31 horizon is 6 to 14 inches thick. It ranges from reddish yellow, white, or very pale brown. Mottling is in shades of red, yellow, brown, or gray. The texture ranges from sandy clay loam to sandy clay. The content of concretions ranges from none to few ferromanganese and from none to common calcium carbonate. Reaction ranges from neutral through moderately alkaline.

The B32ca horizon ranges from 4 to 12 inches in thickness. The content of soft masses of calcium carbonate ranges from 0 to 40 percent, by volume.

The C horizon is 50 to 68 inches below the surface. It is light gray, white, or very pale brown. The texture ranges from loamy fine sand to sandy clay loam. Reaction ranges from neutral through moderately alkaline.

LmC—Leming loamy fine sand, 0 to 5 percent slopes. This nearly level to gently sloping soil is on uplands. Slopes are dominantly 1 to 3 percent, but range from 0 to 5 percent. Areas range from 10 to 350 acres or more in size and are irregular in shape.

Included in some mapped areas of this soil are 1- to 4-acre areas of Sarnosa, Nueces, and Sarita soils, small areas of a soil that is similar to the Leming soil but has a thinner surface layer and lacks gray mottles in the upper part of the B2t horizon, and 1- to 3-acre areas of a soil that is similar to the Leming soil but has a sandy surface layer 10 to 20 inches thick. Also included are a few areas of Leming soils where slopes are as much as 8 percent. Included soils make up less than 10 percent of any mapped area.

This Leming soil is poorly suited to crops. Nearly all the acreage is range. A few areas are farmed, and a few are in improved pasture. Soil blowing is a severe hazard, and water erosion a slight hazard. Capability unit IIIe–9; Loamy Sand range site; pasture and hayland group 9A.

Lupe Series

The Lupe series consists of deep, gently sloping to sloping, calcareous gravelly loamy soils of the uplands. These soils formed in ancient stream terrace deposits of gravelly, calcareous loamy sediments.

In a representative profile the surface layer is dark grayish brown gravelly sandy clay loam about 12 inches thick. Below this is about 12 inches of very pale brown very gravelly sandy clay loam, 8 inches of very pale brown very gravelly sandy clay loam, and 28 inches of very pale brown gravelly fine sandy loam. The underlying material to a depth of 84 inches is white loam with few, fine, faint, very pale brown mottles.

These soils are well drained, and runoff is medium. Permeability is moderate, and the available water capacity is medium.

Most areas are used for range. Some are established to improved pasture, and some are mined for gravel.

Representative profile of Lupe gravelly sandy clay loam, 1 to 8 percent slopes, 15 miles north of Cuero on U.S. Highway 183 to the Guadalupe River bridge, 0.7 mile northwest on U.S. Highway 183, 2.4 miles southwest on Farm Road 766; then 265 feet southeast of the road; in range:

A11—0 to 6 inches, dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; hard, very friable; common fine

roots; 15 percent siliceous pebbles; calcareous; moderately alkaline; gradual smooth boundary.

A12—6 to 12 inches, dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; hard, very friable; common fine roots; 40 percent siliceous pebbles, 1 to 3 inches in diameter; calcareous; moderately alkaline; gradual smooth boundary.

B2—12 to 24 inches, very pale brown (10YR 7/3) very gravelly sandy clay loam, brown (10YR 5/3) moist; moderate very fine subangular blocky structure; hard, very friable; few fine roots; about 50 percent siliceous pebbles; common calcium carbonate films on coarse fragments; calcareous; moderately alkaline; gradual smooth boundary.

B3ca—24 to 32 inches, very pale brown (10YR 8/3) very gravelly sandy clay loam, very pale brown (10YR 7/3) moist; weak medium subangular blocky structure; hard, very friable; about 70 percent siliceous pebbles; common calcium carbonate segregations in soft masses and as films on coarse fragments; calcareous; moderately alkaline; gradual smooth boundary.

C1ca—32 to 60 inches, very pale brown (10YR 8/4) gravelly fine sandy loam, very pale brown (10YR 7/4) moist; massive; slightly hard, very friable; about 15 percent siliceous pebbles; about 15 percent soft masses and films of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

C2ca—60 to 84 inches, white (10YR 8/2) loam, light gray (10YR 7/2) moist; few, fine, faint, very pale brown mottles; massive; hard, very friable; about 10 percent soft masses of calcium carbonate; about 4 percent siliceous pebbles; calcareous; moderately alkaline.

The solum is 26 to 40 inches thick. The clay content at the 10- to 40-inch depth is 20 to 32 percent.

The A11 horizon is 5 to 10 inches thick. It is dark grayish brown, grayish brown, very dark gray, or dark gray. The content of gravel ranges from 15 to 40 percent.

The A12 horizon is 5 to 10 inches thick. It is dark grayish brown, grayish brown, brown, or dark gray. The content of gravel ranges from 35 to 50 percent.

The B2 horizon is 8 to 18 inches thick. It is yellowish brown, brown, pale brown, or very pale brown. The texture is loam, sandy clay loam, or clay loam. The content of gravel ranges from 35 to 60 percent.

The B3ca horizon is 6 to 14 inches thick. It is brown, light yellowish brown, or very pale brown. The texture is loam or sandy clay loam. The content of gravel ranges from 35 to 75 percent.

The C horizon ranges from 20 to 40 inches below the surface. It is white or very pale brown. Mottles range from none to common, medium, distinct, yellowish brown, very pale brown, or pale brown. The texture is fine sandy loam, loam, or sandy clay loam. The content of sandstone fragments ranges from none to 30 percent. The content of soft masses of calcium carbonate ranges from 5 to 30 percent, and the content of siliceous pebbles, from none to 15 percent.

LuD—Lupe gravelly sandy clay loam, 1 to 8 percent slopes. This gently sloping to sloping soil is in upland areas that are mostly along the breaks of the Guadalupe River flood plain. Areas are long or irregular in shape and range from about 8 to 100 acres or more in size.

Included in some mapped areas of this soil are 1- to 3-acre areas of Sarnosa, Shiner, Silvern, and Ellen soils and small areas of a soil that is more clayey. Included soils make up less than 15 percent of any mapped area.

This soil is used mostly for range. A few small areas have been mined for gravel. A few are in improved pasture. The slope and gravel content make this soil unsuitable for crops. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit VIs–2; Gravelly Loam range site; pasture and hayland group 8C.

Mabank Series

The Mabank series consists of deep, nearly level to gently sloping, noncalcareous loamy soils of uplands. These soils formed in marine clay and shale.

In a representative profile the surface layer is gray fine sandy loam about 7 inches thick. The subsoil is about 49 inches thick. The upper 12 inches is very dark gray clay, the next 18 inches is dark gray clay, and the lower 19 inches is gray clay. Below this to a depth of 84 inches is light gray sandy clay loam.

These soils are somewhat poorly drained and have very slow to medium runoff. Permeability is very slow, and the available water capacity is high.

These soils are used mainly as range. Several areas were farmed, but have been abandoned. A few are in improved pasture.

Representative profile of Mabank fine sandy loam, 0 to 1 percent slopes, 7.5 miles north on U.S. Highway 183 from its intersection with U.S. Highway 87 in Cuero; 0.35 mile east on a paved county road; 50 feet south of road fence and 60 feet west of a partition fence; in range:

Ap—0 to 7 inches, gray (10YR 6/1) fine sandy loam, dark gray (10YR 4/1) moist; massive; hard, very friable; many roots and pores; few worm casts; slightly acid; abrupt wavy boundary.

B21t—7 to 19 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium blocky structure; extremely hard, extremely firm, very sticky and plastic; few fine roots; continuous clay films; few sand grain coatings on ped surfaces; few worm casts; neutral; gradual smooth boundary.

B22t—19 to 37 inches, dark gray (10YR 4/1) clay, black (10YR 2/1) moist; strong medium to coarse blocky structure; extremely hard, extremely firm, very sticky and plastic; few fine roots; continuous clay films; few fine threads of calcium carbonate and few pitted calcium carbonate concretions in lower part; mildly alkaline; gradual smooth boundary.

B23t—37 to 56 inches, gray (10YR 6/1) clay, grayish brown (10YR 5/2) moist; weak coarse blocky structure; very hard, very firm, very sticky; few fine threads of calcium carbonate and few small calcium carbonate concretions; few small ferromanganese concretions; mildly alkaline; diffuse smooth boundary.

B3—56 to 84 inches, light gray (5Y 7/2) sandy clay loam, light olive gray (5Y 6/2) moist; weak subangular blocky structure; very hard, very firm, very sticky; few ferromanganese concretions; mildly alkaline.

The solum is 60 to 80 inches thick.

The A1 horizon is 6 to 10 inches thick. It is dark gray, grayish brown, gray, very dark gray, or dark grayish brown. Reaction ranges from slightly acid to neutral.

The B21t horizon is 11 to 24 inches thick. It is very dark gray, grayish brown, or dark gray. The texture ranges from clay to sandy clay. Reaction ranges from medium acid through mildly alkaline.

The B22t horizon, 10 to 30 inches thick, is dark gray, grayish brown, light brownish gray, light gray, or gray. The texture ranges from sandy clay to clay. Reaction ranges from slightly acid to moderately alkaline.

The B23t horizon is 9 to 20 inches thick. It is light gray, gray, or grayish brown. The texture ranges from sandy clay to clay. Reaction ranges from neutral to moderately alkaline.

The B3 horizon ranges from 50 to 62 inches below the

surface. It is light gray, white, olive yellow, light olive yellow, or pale olive. The texture ranges from sandy clay loam to clay.

MaA—Mabank fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 7 to 100 acres or more in size and are irregular in shape. They are on lower parts of the landscape. This soil has the profile described as representative of the Mabank series.

Included in some mapped areas of this soil are 1- to 5-acre areas of Crockett, Wilson, Miguel, Tremona, and Straber soils. Included soils make up less than 15 percent of any mapped area.

This Mabank soil is mostly used as range. Several areas of abandoned fields are now used as range. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIIw–1; Claypan Prairie (BL) range site; pasture and hayland group 8A.

MaB—Mabank fine sandy loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas range from 6 to 80 acres or more in size. They are irregular in shape and are on the lower parts of the landscape.

The surface layer is gray fine sandy loam about 6 inches thick. The subsoil is about 52 inches thick. The upper 15 inches is very dark gray clay, the next 21 inches is dark gray clay, and the lower 16 inches is gray sandy clay. Below this is light gray sandy clay.

Included in some mapped areas of this soil are 1- to 4-acre areas of Crockett, Wilson, Tremona, Straber, and Miguel soils. Included soils make up less than 10 percent of any mapped area.

This soil is mainly used as range. A few areas are in improved pasture. A few areas were farmed, but most have been abandoned. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIIe–1; Claypan Prairie (BL) range site; pasture and hayland group 8A.

Meguin Series

The Meguin series consists of deep, nearly level, calcareous loamy soils of the bottom land. These soils formed in loamy alluvium.

In a representative profile the surface layer is dark grayish brown silty clay loam about 12 inches thick. Next is about 32 inches of silty clay loam. It is grayish brown in the upper 6 inches and pale brown in the lower 26 inches. The underlying material to a depth of 62 inches is very pale brown loam.

These soils are well drained and have slow runoff. Permeability is moderate, and the available water capacity is high.

Most areas are used for crops, pasture, and range. Some are pecan orchards.

Representative profile of Meguin silty clay loam, occasionally flooded, 10 miles north from the intersection of U.S. Highways 183 and 87 in Cuero on U.S. Highway 183 to its intersection with Farm Road 951; then 0.8 mile west on a county road; then 0.9 mile west on a private road, and 125 feet west and 50 feet north of a field corner; in pasture:

A—0 to 12 inches, dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky and moderate medium granular structure; hard, friable, slightly sticky; common fine roots; common fine pores and worm casts; common fine snail shell fragments; calcium carbonate equivalent about 15 percent; calcareous; moderately alkaline; gradual smooth boundary.

B21—12 to 18 inches, grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak very fine subangular blocky structure; hard, friable, slightly sticky; common fine roots; few fine snail shell fragments; calcareous; moderately alkaline; abrupt smooth boundary.

B22—18 to 44 inches, pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; weak very fine subangular blocky structure; slightly hard, very friable; few fine roots in upper part; few threads and films of calcium carbonate; calcium carbonate equivalent about 34 percent; calcareous; moderately alkaline; gradual smooth boundary.

C—44 to 62 inches, very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable; few thin strata of silt loam and silty clay loam ⅛ to 2 inches thick that are slightly darker in color; few fine soft masses and few films of calcium carbonate; calcareous; moderately alkaline.

The A1 horizon is 8 to 18 inches thick. It is gray, dark gray, dark grayish brown, dark brown, grayish brown, or brown. The upper 7 inches is silty clay loam, clay loam, or clay.

The B horizon is grayish brown, brownish gray, brown, or pale brown. The calcium carbonate equivalent is 20 to 38 percent. The texture is silty clay loam, clay loam, or silt loam thinly stratified with clay, silty clay, or loam.

The C horizon is light brownish gray, pale brown, or very pale brown.

Me—Meguin silty clay loam, occasionally flooded. This nearly level soil is on flood plains of the Guadalupe River and other major streams of the county. Areas are irregular in shape and range from 20 to about 350 acres or more in size. Slopes are 0 to 1 percent. This soil is flooded once in 4 to 10 years. It has the profile described as representative of the Meguin series.

Included in some mapped areas of this soil are 1- to 7-acre areas of a soil having a dark colored surface layer more than 20 inches thick and a soil similar to Meguin soils but coarser textured. Included soils make up less than 15 percent of any mapped area.

This soil is well suited to crops. Many areas are used for crops commonly grown in the county. Several are used for improved pasture. A few are used for range (fig. 1). A few are pecan groves. Soil blowing and water erosion are slight hazards. Capability unit IIw–2; Loamy Bottomland range site; pasture and hayland group 1C.

Mf—Meguin soils, frequently flooded. These nearly level soils are on flood plains of the Guadalupe River and other streams of the county. Texture of the surface layer is variable and includes silty clay loam, clay loam, and clay. Areas are irregular in shape and range from about 20 to 200 acres or more in size. Slopes are 0 to 1 percent. This soil is flooded once or more each year.

The surface layer is dark grayish brown silty clay loam about 15 inches thick. Below this is 22 inches of grayish brown silty clay loam and 23 inches of pale brown silty clay loam. The underlying material to a depth of 82 inches is very pale brown loam.

Included in some mapped areas of this soil are small areas having dark colors thicker than 20 inches and small areas having dark colors less than 10 inches

Figure 1.—**Harvesting johnsongrass hay on Meguin silty clay loam, occasionally flooded.**

thick. Included soils make up less than 12 percent of any mapped area.

This mapping unit is flooded too frequently to be used for crops (fig. 2). Most areas are in range. Several are improved pasture, and several are pecan groves. Soil blowing and water erosion are slight hazards. Capability unit Vw–1; Loamy Bottomland range site; pasture and hayland group 1C.

Miguel Series

The Miguel series consists of deep, gently sloping, noncalcareous loamy soils of the uplands. These soils formed in clayey to loamy sediments.

In a representative profile the surface layer is brown fine sandy loam about 6 inches thick. The subsoil is about 34 inches thick. In sequence downward, it is 9 inches of brown clay distinctly mottled with red and yellowish brown, 15 inches of brownish yellow clay distinctly mottled with very pale brown and yellowish red, and 10 inches of reddish yellow sandy clay. The underlying material is reddish yellow sandy clay loam.

These soils are well drained and have rapid runoff. The available water capacity is medium. Permeability is very slow.

These soils are not well suited to crops. Most areas are used for range. Some are in improved pasture. Only a few scattered areas are farmed.

Representative profile of Miguel fine sandy loam, 3 to 5 percent slopes, 3.5 miles northwest on Texas Highway 119 from the intersection of Texas Highways 72 and 119 in Yorktown; then 5.8 miles north-northwest on Farm Road 108, and 0.8 mile northwest on a county road; then 0.15 mile west on a county road and 40 feet south of the road; in range:

A—0 to 6 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; very hard, friable; many fine roots; slightly acid; abrupt smooth boundary.

B21t—6 to 15 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; distinct red (2.5YR 4/6) and yellowish brown (10YR 5/6) mottles; strong medium prismatic structure; extremely hard, firm, plastic and sticky; many fine roots; organic stains and dark coatings on faces of prisms; clay films on peds; neutral; clear smooth boundary.

B22t—15 to 30 inches, brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/6) moist; few fine distinct very pale brown (10YR 7/4) and yellowish red (5YR 5/6) mottles; moderate medium and fine angular blocky structure; very hard, very firm, plastic and sticky, few fine roots between peds; clay films on faces of peds; neutral; gradual smooth boundary.

B3t—30 to 40 inches, reddish yellow (7.5YR 6/6) sandy clay, strong brown (7.5YR 5/6) moist; weak fine

Figure 2.—**Floodwater on Meguin soils in areas of river bottom land.**

subangular blocky structure; very hard, very firm, plastic and sticky; few clay films; few fine calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

C—40 to 60 inches, reddish yellow (7.5YR 7/8) sandy clay loam, reddish yellow (7.5YR 6/8) moist; massive; hard, friable; calcareous; moderately alkaline.

The solum is 40 to 60 inches thick. Depth to secondary carbonates ranges from 28 to 40 inches. The A horizon is 6 to 12 inches thick. It is dark grayish brown, brown, dark brown, or grayish brown. Reaction is slightly acid to neutral.

The B2t horizon is 10 to 35 inches thick. It is dark grayish brown, brownish yellow, dark brown, brown, yellowish brown, or light brown. Mottles are common or many and fine or medium, in shades of brown, red, or yellow. The texture of the B2t horizon is sandy clay or clay. Reaction is neutral to mildly alkaline.

The B3t horizon is 4 to 16 inches thick. It is light brown, reddish yellow, brown, light yellowish brown, or yellowish red. It is sandy clay loam or sandy clay. Reaction is mildly alkaline to moderately alkaline.

The C horizon is light brownish gray, light gray, light brown, yellowish red, reddish yellow, or brownish yellow. It is sandy clay loam or sandy clay.

MgC—Miguel fine sandy loam, 3 to 5 percent slopes. This gently sloping soil has the profile described as representative of the series. Areas range from 8 to 60 acres or more in size. They are irregular in shape.

Included in some mapped areas of this soil are 1- to 3-acre areas of Sarnosa, Papalote, Runge, Leming, and Weesatche soils. Included soils make up less than 12 percent of any mapped area.

This soil is poorly suited to crops, but is well suited to range or improved pasture. Most areas are in range. Some are used for improved pasture. Only a few are cropped. Capability unit IVe–3; Tight Sandy Loam range site; pasture and hayland group 8A.

MgC2—Miguel fine sandy loam, 3 to 5 percent slopes, eroded. This gently sloping soil is on uplands. Areas are irregular in shape and range from 8 to 40 acres or more in size.

The present surface layer is about 6 inches of brown fine sandy loam, but many areas are galled. It is a mixture of the original layer and the underlying layer. Below this is a distinctly mottled, dark grayish brown clay subsoil about 30 inches thick. The next 18 inches is light brown sandy clay. The underlying material is yellowish red sandy clay.

Gullies 100 to 500 feet apart, 5 feet deep, and 12 feet wide have formed in some areas.

Included in some mapped areas of this soil are 1- to 3-acre areas of Leming, Papalote, Sarnosa, Runge, and Weesatche soils. Included soils make up less than 10 percent of any mapped area.

This soil is poorly suited to crops. Nearly all areas are used for range. A few have been cropped but are

now abandoned, and a few are in improved pasture. Capability unit IVe–3; Tight Sandy Loam range site; pasture and hayland group 8A.

Monteola Series

The Monteola series consists of deep, nearly level to gently sloping, calcareous clayey soils of the uplands. These soils formed in clay and shaly clay.

In a representative profile the surface layer is very dark gray clay about 30 inches thick. The next layer is clay about 22 inches thick. The upper part is grayish brown, and the lower part is very pale brown. The underlying material to a depth of 84 inches is mottled very pale brown and yellow clay.

These soils are moderately well drained and have slow to medium runoff. Permeability is very slow, and the available water capacity is medium.

These soils are well suited to crops, and many areas are farmed. They are also used for range and improved pasture.

Representative profile of Monteola clay, 1 to 3 percent slopes, 18 miles southwest of Cuero via U.S. Highway 87 and Texas Highway 72 to Yorktown; 3 miles northwest on Texas Highway 119 from its intersection with Texas Highway 72 in Yorktown; 3.2 miles northwest on Farm Road 108; 1.75 miles west-northwest on a paved county road; 0.75 mile south-southwest on a county road to a gap; 0.35 mile east-southeast along a fence line, 50 feet north of fence; in crops:

Ap—0 to 5 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate fine and very fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine roots; few fine snail shell fragments; calcareous; moderately alkaline; abrupt smooth boundary.

A1—5 to 30 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; few intersecting slickensides; common parallelepipeds tilted 10 to 30 degrees from horizontal; moderate very fine and fine angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots; few fine calcium carbonate concretions; few shell fragments; calcareous; moderately alkaline; gradual wavy boundary.

AC1—30 to 40 inches, grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate fine angular blocky structure; extremely hard, very firm, very sticky and plastic; common fine roots; few fine snail shell fragments; few intersecting slickensides; few calcium carbonate concretions; calcareous; moderately alkaline; gradual wavy boundary.

AC2—40 to 52 inches, very pale brown (10YR 7/3) clay, pale brown (10YR 6/3) moist; moderate fine angular blocky structure; extremely hard, very firm, very sticky and plastic; few fine roots; few intersecting slickensides; few calcium carbonate concretions; calcareous; moderately alkaline; clear wavy boundary.

IIC—52 to 84 inches, mottled very pale brown (10YR 8/4) and yellow (10YR 7/6) clay; massive; extremely hard, very firm, very sticky and plastic; common soft masses of calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 60 inches thick. The Ap horizon is 4 to 6 inches thick. It is dark gray or very dark gray.

The A1 horizon is 10 to 25 inches thick and is dark gray or very dark gray.

The AC1 horizon is 8 to 14 inches thick. It is gray, light brownish gray, grayish brown, dark grayish brown, pale brown, dark brown, or very dark gray.

The AC2 horizon is 5 to 15 inches thick and is gray, very pale brown, light brownish gray, pale brown, grayish brown, or dark grayish brown.

The IIC horizon ranges from 40 to 60 inches below the surface. It is white, light gray, or very pale brown.

MoA—Monteola clay, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 10 to 200 acres or more in size. They are irregular in shape.

The surface layer is very dark gray clay about 14 inches thick. Below this is dark grayish brown clay about 26 inches thick. The underlying material is light gray clay.

Included in some mapped areas of this soil are 2- to 4-acre narrow areas of Runge soils and 1- to 3-acre oval shaped areas of Orelia soils. Included soils make up less than 12 percent of any mapped area.

This soil is well suited to crops. About half the acreage is farmed. Several areas are in range. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIs–1; Blackland range site; pasture and hayland group 7A.

MoB—Monteola clay, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas range from 12 to 250 acres or more in size and are irregular in shape. This soil has the profile described as representative of the Monteola series.

Included in some mapped areas of this soil are small areas of Runge, Sarnosa, and Cuero soils. Included soils make up less than 8 percent of any mapped area.

This soil is well suited to crops. Many areas are farmed. Several are in range, and a few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIIe–2; Blackland range site; pasture and hayland group 7A.

Natraqualfs

Natraqualfs (Na) are deep, nearly level, calcareous loamy soils that formed in loamy saline sediments and have a high sodium content. They are on uplands in concave flats adjacent to and slightly higher than the flood plains of creeks. Areas are irregular in shape and range from 15 to 200 acres or more in size. Slopes are 0 to 1 percent.

Included in some mapped areas of these soils are scattered 1- to 4-acre areas of Wilson soils. Included soils make up less than 15 percent of any mapped area.

Natraqualfs are somewhat poorly drained, and runoff is slow. Permeability is moderately slow. The available water capacity is low.

Natraqualfs are used as range. The choice of plants suited to these saline soils is limited. Only salt-tolerant plants and pasture grasses can be grown. Soil blowing and water erosion are slight hazards. Capability unit VIs–1; Salty range site.

Nueces Series

The Nueces series consists of deep, nearly level to gently sloping, noncalcareous sandy soils of the uplands. These soils formed in sandy to loamy material.

In a representative profile the surface layer is light brownish gray fine sand in the upper 18 inches and pale brown fine sand in the lower 16 inches. The next 30 inches is light gray sandy clay loam mottled with yellowish brown and red. Below this to a depth of 72

inches is reddish yellow sandy clay loam mottled with light gray and red.

These soils are moderately well drained and have very slow runoff. Permeability is moderately slow, and the available water capacity is low.

Most of the acreage is used as range. A few areas are in improved pasture of bermudagrass. A few scattered areas are farmed.

Representative profile of Nueces fine sand in an area of Nueces-Sarita complex, 0 to 5 percent slopes, 6 miles west of Cuero on U.S. Highway 87 to intersection with Texas Highway 72, 3.6 miles southwest on Texas Highway 72 to a cattle guard at the top of a small hill; 0.35 mile southeast and south on a private road; 50 feet west; in range:

A11—0 to 18 inches, light brownish gray (10YR 6/2) fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; few fine roots; neutral; gradual smooth boundary.

A12—18 to 34 inches, pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; few fine roots; neutral; abrupt wavy boundary.

B21t—34 to 50 inches, light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; common coarse distinct yellowish brown (10YR 5/6) and common medium and coarse prominent red (10R 4/6) mottles; weak coarse angular blocky structure; extremely hard; few fine roots; common fine pores; few thin clay films; neutral; gradual smooth boundary.

B22t—50 to 64 inches, light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; common medium distinct yellowish brown (10YR 5/6) and common coarse distinct red (10R 4/6) mottles; weak coarse angular blocky structure; extremely hard, very friable; few thin clay films; neutral; gradual wavy boundary.

B3—64 to 72 inches, reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; few medium distinct light gray (10YR 7/2) and few coarse distinct red (2.5YR 5/8) mottles; weak coarse blocky structure; very hard, very friable; few thin clay films; neutral; gradual wavy boundary.

The solum is 60 to 100 inches thick.

The A horizon is 20 to 40 inches thick. The color is light brownish gray, light brown, brown, or pale brown. The texture is fine sand or loamy fine sand. Reaction ranges from slightly acid to neutral.

The B21t horizon is 8 to 22 inches thick. The color is brown, light gray, yellow, or yellowish brown. Mottling ranges from none to common red, yellowish red, or yellowish brown. Reaction ranges from slightly acid through moderately alkaline.

The B22t horizon is 0 to 18 inches thick. The color is grayish brown, light brownish gray, yellow, brown, yellowish brown, or light gray. Mottling ranges from few to common dark red, red, yellowish brown, or brownish yellow. Reaction ranges from neutral through moderately alkaline.

The B3 horizon is 8 to 16 inches thick. The color is reddish yellow, yellowish brown, yellow, or light gray.

NsC—Nueces-Sarita complex, 0 to 5 percent slopes. This nearly level to gently sloping mapping unit is on uplands. It is about 60 percent Nueces soils and 35 percent Sarita soils. The Nueces soil is in swales, and the Sarita soil is on ridges. Areas range from about 12 to 300 acres or more in size and are irregular in shape.

Included in mapped areas of these soils are small areas of Leming and Miguel soils. Included soils make up less than 10 percent of any one mapped area.

These soils are used mostly as range. A few areas are in improved pasture, and a few scattered areas are farmed. Capability unit IIIe–5; Deep Sand range site; pasture and hayland group 9A.

Orelia Series

The Orelia series consists of deep, nearly level to gently sloping, noncalcareous loamy soils of the uplands. These soils formed in loamy sediments.

In a representative profile the surface layer is grayish brown fine sandy loam about 4 inches thick. Below this is 22 inches of sandy clay loam, which is dark gray in the upper part and gray in the lower part. The next 19 inches is white sandy clay loam. The underlying material to a depth of 80 inches is white sandy clay loam mottled with reddish yellow.

These soils are somewhat poorly drained and have slow runoff. Permeability is very slow, and the available water capacity is medium.

These soils are used mainly as range. A few areas are in improved pasture.

Representative profile of Orelia fine sandy loam, 0 to 2 percent slopes, 6 miles west of Cuero on U.S. Highway 87 to its intersection with Texas Highway 72; then 7.3 miles southwest on Texas Highway 72 to its intersection with a county road, and 575 feet southeast on a gravel county road and 50 feet south of the road; in range:

A1—0 to 4 inches, grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; very hard, friable; many fine roots; slightly acid; abrupt wavy boundary.

B21tg—4 to 16 inches, dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; moderate medium angular blocky structure; extremely hard, very firm, sticky; few fine roots; thin clay films; mildly alkaline; gradual smooth boundary.

B22tg—16 to 26 inches, gray (10YR 5/1) sandy clay loam, dark gray (10YR 4/1) moist; moderate medium angular blocky structure; extremely hard, very firm; few fine roots; common clay films; few strongly cemented calcium carbonate concretions; common masses of gypsum crystals; calcareous; moderately alkaline; gradual smooth boundary.

B3t—26 to 45 inches, white (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; common medium distinct yellow (10YR 7/8) mottles; weak medium angular blocky structure; extremely hard, very firm, sticky; few fine roots in upper part; common clay films; common strongly cemented calcium carbonate concretions; common fine ferromanganese concretions; calcareous; moderately akaline; gradual smooth boundary.

C—45 to 80 inches, white (2.5Y 8/2) sandy clay loam, light gray (2.5Y 7/2) moist; common, medium distinct reddish yellow (7.5YR 6/8) mottles; massive; very hard, very firm, sticky; calcareous; moderately alkaline.

The solum is 30 to 50 inches thick.

The A horizon is 4 to 10 inches thick. It is dark grayish brown, grayish brown, dark gray, or gray. Reaction is slightly acid through neutral.

The B2t horizon ranges from 19 to 40 inches in thickness. It is gray, dark gray, or very dark gray. Many pedons have a few fine mottles of brown, light brownish gray, light yellowish brown, or reddish brown. The texture is clay loam or sandy clay loam. Reaction is mildly alkaline through moderately alkaline.

The B3t horizon is gray, light gray, or white mottled with yellow, olive yellow, or light olive brown.

The C horizon is white or light gray. The texture is clay loam or sandy clay loam.

OrB—Orelia fine sandy loam, 0 to 2 percent slopes. This nearly level to gently sloping soil is on uplands.

Areas range from 8 to 250 acres or more and are concave and irregular in shape.

Included in some mapped areas of this soil are 1- to 4-acre areas of a soil that is saline but is otherwise similar to this Orelia fine sandy loam. Also included are 1- to 3-acre areas of Miguel, Denhawken, and Elmendorf soils. Included soils make up less than 12 percent of any mapped area.

This soil is not well suited to farming. Most areas are used for range. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIIw–1; Claypan Prairie (RG) range site; pasture and hayland group 8A.

Papalote Series

The Papalote series consists of deep, nearly level to gently sloping, noncalcareous loamy soils of the uplands. These soils formed in clayey to loamy sediments.

In a representative profile the surface layer is light brownish gray fine sandy loam about 9 inches thick. The subsoil is sandy clay to a depth of 40 inches. The upper 11 inches is light brownish gray mottled with yellowish red and brownish yellow, and the next 20 inches is mottled light gray, brownish yellow, and reddish yellow. The lower 8 inches of the subsoil is red clay loam. The underlying material is pink sandy clay loam.

These soils are moderately well drained and have slow to medium runoff. Permeability is slow, and the available water capacity is medium.

Most areas are used for range. Some are improved pasture. Only a few scattered areas are farmed.

Representative profile of Papalote fine sandy loam, 1 to 3 percent slopes, 5.45 miles south on Farm Road 236 from the intersection of U.S. Highway 183 and Farm Road 236 in Cuero; then 85 feet east of the highway; in range:

A—0 to 9 inches, light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; very hard, friable; common fine roots; neutral; abrupt wavy boundary.

B21t—9 to 20 inches, light brownish gray (10YR 6/2) sandy clay, grayish brown (10YR 5/2) moist; common medium and fine prominent yellowish red (5YR 5/6) and few medium prominent brownish yellow (10YR 6/6) mottles; strong medium prismatic structure parting to weak medium angular blocky; extremely hard, very firm, plastic and sticky; common fine roots; organic stains and dark coatings on faces of peds; common thick clay films; few fine siliceous pebbles; neutral; gradual wavy boundary.

B22t—20 to 40 inches, prominently and coarsely mottled light gray (10YR 7/2) and brownish yellow (10YR 6/6) sandy clay; common medium prominent reddish yellow (5YR 6/6) mottles; moderate medium prismatic structure parting to medium and fine angular blocky; extremely hard, very firm, plastic and sticky; few fine roots; common thick clay films; neutral; gradual wavy boundary.

B3ca—40 to 48 inches, red (2.5YR 5/6) clay loam, red (2.5YR 4/6) moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; few fine roots; few thin clay films; few fine calcium carbonate concretions; mildly alkaline; gradual wavy boundary.

C1ca—48 to 60 inches, pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; massive; hard, friable; about 5 percent weakly cemented calcium carbonate concretions; calcareous; moderately alkaline; clear wavy boundary.

C2ca—60 to 82 inches, pink (5YR 7/4) sandy clay loam, light reddish brown (5YR 6/4) moist; massive; hard, friable; about 30 percent soft masses of calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 60 inches thick.

The A horizon is 6 to 10 inches thick. It is light brownish gray, brown, or grayish brown. Reaction is slightly acid or neutral.

The B21t horizon is 8 to 16 inches thick. It is dark grayish brown, light brownish gray, brown, or dark brown, and it contains few or common, fine or medium, distinct mottles in shades of yellow, red, brown, or gray. The texture is sandy clay or clay. The reaction is neutral or mildly alkaline.

The B22t horizon is 10 to 20 inches thick. It is dark grayish brown, light brownish gray, brown, or grayish brown. It is mottled in shades of red, yellow, brown, or gray. The texture is sandy clay or clay. The reaction is neutral or mildly alkaline.

The B3ca horizon is 8 to 16 inches thick. It is light brown, reddish yellow, brown, or light brownish gray, and it may have faint or distinct mottles in shades of red, yellow, brown, or gray. The texture ranges from sandy clay loam to sandy clay. Reaction is mildly alkaline or moderately alkaline.

The C horizon is light brownish gray, reddish yellow, or pink. The texture is sandy clay loam or sandy clay.

PaA—Papalote fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas are irregular in shape and range from about 5 to 30 acres in size.

The surface layer is grayish brown fine sandy loam about 10 inches thick. The upper 26 inches of the subsoil is dark grayish brown clay distinctly mottled with red and light yellowish brown. The lower 8 inches is light brown sandy clay loam. The underlying material is light brownish gray sandy clay loam.

Included in some mapped areas of this soil are small areas of Mabank, Leming, and Orelia soils. Mabank and Orelia soils are in somewhat depressed areas, and Leming soils are on elevated, convex spots. Also included are small areas of Papalote fine sandy loam having slopes of 1 to 3 percent. Included soils make up less than 15 percent of any mapped area.

This soil is best suited to range or improved pasture. Nearly all areas are used as range. A few are improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIs–2; Tight Sandy Loam range site; pasture and hayland group 8A.

PaB—Papalote fine sandy loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. It has the profile described as representative of the Papalote series. Areas range from about 12 to 150 acres or more is size. They are irregular in shape.

Included in some mapped areas of this soil are 1- to 3-acre areas of Mabank, Miguel, Leming, Nueces, Sarita, Sarnosa, and Runge soils. Included soils make up less than 12 percent of any mapped area.

This soil is suitable for range or improved pasture. Most areas are used as range. A few are improved pasture, and a few are farmed. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIe–2; Tight Sandy Loam range site; pasture and hayland group 8A.

Runge Series

The Runge series consists of deep, nearly level to

gently sloping, noncalcareous loamy soils of the uplands. These soils formed in loamy calcareous material derived from sandstone or alluvium.

In a representative profile the surface layer is brown fine sandy loam about 15 inches thick. The subsoil to a depth of 32 inches is sandy clay loam. It is reddish brown in the upper part and reddish yellow in the lower part. The underlying material to a depth of 80 inches is reddish yellow sandy clay loam.

These soils are well drained and have medium runoff. Permeability is moderate, and the available water capacity is high.

These soils are used mainly as range. Some areas are farmed. A few are improved pasture.

Representative profile of Runge fine sandy loam, 1 to 3 percent slopes, 6 miles northwest of Cuero on U.S. Highway 87; then 20.3 miles southwest on Texas Highway 72 to the first county road in a northwest direction, past Nordheim; 3.5 miles northwest on a county road and 125 feet north of the road; in range:

A1—0 to 15 inches, brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable; many fine roots; slightly acid; gradual smooth boundary.

B21t—15 to 21 inches, reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to weak subangular blocky; slightly hard, friable; few fine roots; few fine pores; common clay films and dark coatings on faces of peds; neutral; gradual smooth boundary.

B22t—21 to 32 inches, reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium prismatic structure parting to weak subangular blocky; hard, friable, slightly sticky; few fine roots; few thin clay films and dark coatings on faces of peds; few fine calcium carbonate concretions below 26 inches; mildly alkaline; gradual smooth boundary.

B3—32 to 44 inches, reddish yellow (7.5YR 6/6) sandy clay loam, reddish yellow (7.5YR 6/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky; many fine and medium pores; few fine soft masses and concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

Cca—44 to 80 inches, reddish yellow (7.5YR 7/6) sandy clay loam, reddish yellow (7.5YR 6/6) moist; massive; hard, friable; about 20 percent soft masses of calcium carbonate; few strongly cemented calcium carbonate concretions; calcareous; moderately alkaline.

The solum is 40 to 60 inches thick.

The A1 horizon is 7 to 16 inches thick. It is dark brown, brown, or dark grayish brown. Reaction is slightly acid through mildly alkaline.

The B2t horizon ranges from 14 to 35 inches in thickness and is reddish brown, yellowish red, or reddish yellow. It is sandy clay loam or clay loam. Reaction ranges from neutral through moderately alkaline.

The B3 horizon is reddish yellow or yellowish red.

The Cca horizon is brown, reddish yellow, light brown, light yellowish brown, or very pale brown sandy clay loam, clay loam, or loam. The content of visible secondary concretions of calcium carbonate ranges from 5 to 15 percent.

RuA—Runge fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 12 to 90 acres or more in size. They are irregular in shape.

The surface layer is brown fine sandy loam about 6 inches thick. Below this is 10 inches of dark grayish brown fine sandy loam, 10 inches of yellowish red sandy clay loam, and 16 inches of reddish brown sandy clay loam. The underlying material is light brown loam.

Included in some mapped areas of this soil are 1- to 6-acre areas of a soil that has a grayer subsoil but is otherwise similar to this Runge soil. Also included are areas of Sarnosa, Miguel, Monteola, Cuero, and Weesatche soils. Included soils make up less than 15 percent of any mapped area.

This soil is used mainly as range. Some areas are improved pasture. Capability unit IIc–1; Sandy Loam range site; pasture and hayland group 8C.

RuB—Runge fine sandy loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. It has the profile described as representative of the Runge series. Areas range from 18 to 250 acres or more in size and are irregular in shape.

Included in some mapped areas of this soil are 1- to 4-acre areas of a soil that has a grayer subsoil but is otherwise similar to this Runge soil. Also included are areas of the Papalote, Miguel, Sarnosa, Weesatche, Orelia, and Monteola soils. Included soils make up less than 10 percent of any mapped area.

Most of the acreage is used for range. Several areas are farmed. A few are improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIe–3; Sandy Loam range site; pasture and hayland group 8C.

RuC—Runge fine sandy loam, 3 to 5 percent slopes. This gently sloping soil is on uplands. Areas range from 10 to 85 acres or more in size. They are irregular in shape.

The surface layer is dark grayish brown fine sandy loam about 16 inches thick. The subsoil to a depth of 32 inches is reddish brown sandy clay loam with a few fine soft masses of lime in the lower part. The next 12 inches is reddish yellow sandy clay loam. The underlying material is very pale brown sandy clay loam.

Included in some mapped areas of this soil are 1- to 4-acre areas of a soil that has a grayer subsoil but is otherwise similar to this Runge soil. Also included are areas of the Sarnosa, Weesatche, Shiner, Miguel, and Monteola soils. Included soils make up less than 10 percent of any mapped area.

Most areas are in range. Only a few are farmed. A few are improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IIIe–8; Sandy Loam range site; pasture and hayland group 8C.

Sarita Series

The Sarita series consists of deep, nearly level to gently sloping, noncalcareous soils of the uplands. These soils formed in sandy to loamy eolian and windlaid deposits.

In a representative profile the soil is fine sand to a depth of 50 inches. The upper 24 inches is light brownish gray, and the lower 26 inches is pale brown. Below this is 12 inches of light brownish gray, friable sandy clay loam mottled with yellowish brown and red; 10 inches of very pale brown and light gray, friable sandy clay loam mottled with pink and red; and 10 inches of light gray sandy clay loam mottled with reddish yellow. The underlying material to a depth of 90 inches

is white fine sandy loam mottled with light reddish brown.

Sarita soils are well drained and have slow to very slow runoff. Permeability is moderately rapid, and the available water capacity is low.

Most areas are used for range. A few are improved pasture. A few are farmed to watermelons.

The Sarita soils in De Witt County were mapped only with Nueces soils.

Representative profile of Sarita fine sand in an area of Nueces-Sarita complex, 0 to 5 percent slopes, 6 miles northwest on U.S. Highway 87 from the intersection with U.S. Highway 183 in Cuero to the intersection with Texas Highway 72; then 3.6 miles southwest on Texas Highway 72 to a cattle guard at the top of a hill, and 0.4 mile south on a private road, and 700 feet southwest to an isolated clump of medium-sized live oak trees and 50 feet north; in range:

A11—0 to 24 inches, light brownish gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose, very friable; common fine roots; slightly acid; clear smooth boundary.

A12—24 to 40 inches, pale brown (10YR 6/3) fine sand, dark brown (10YR 4/3) moist; single grained; loose, very friable; few fine roots; slightly acid; clear smooth boundary.

A13—40 to 50 inches, pale brown (10YR 6/3) fine sand, dark brown (10YR 4/3) moist; single grained; loose, very friable; few fine roots; slightly acid; abrupt clear boundary.

B21t—50 to 62 inches, light brownish gray (10YR 6/2) sandy clay loam, grayish brown (10YR 5/2) moist; common coarse distinct yellowish brown (10YR 5/6) and common coarse distinct red (10R 4/6) mottles; weak medium blocky structure; extremely hard, friable, porous; slightly acid; clear wavy boundary.

B22t—62 to 72 inches, mottled matrix of very pale brown (10YR 7/3) and light gray (10YR 7/2) sandy clay loam with common coarse distinct pink (7.5YR 7/4) and common coarse distinct red (2.5YR 5/6) mottles; weak medium blocky structure; very hard, friable; few thin clay films; slightly acid; gradual wavy boundary.

B3—72 to 82 inches, light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; common coarse distinct reddish yellow (7.5YR 7/6) mottles; weak coarse blocky structure; very hard, very friable, slightly acid; gradual wavy boundary.

C—82 to 90 inches, white (10YR 8/2) fine sandy loam, light gray (10YR 7/2) moist; common medium distinct light reddish brown (5YR 6/4) mottles; massive; very hard, friable; slightly acid.

The solum is 60 to about 100 inches thick.

The A11 horizon is 12 to 28 inches thick. It ranges from light brownish gray to light gray to pale brown. Reaction is slightly acid or neutral.

The A12 horizon is 14 to 34 inches thick. It ranges from very pale brown to light brownish gray. Reaction is slightly acid or neutral.

The A13 horizon is 0 to 14 inches thick. It is pale brown, very pale brown, or light gray.

The B21t horizon is 8 to 18 inches thick. It is light brownish gray, pale brown, or very pale brown. Mottles range from few to common in shades of brown, yellow, red, or gray. Reaction ranges from slightly acid to moderately alkaline.

The B22t horizon is 10 to 12 inches thick. It is very pale brown, pale brown, light yellowish brown, or light gray. Mottles range from few to common in shades of red, yellow, brown, or gray. Reaction ranges from slightly acid to moderately alkaline.

The B3 and C horizons are light gray, white, or very pale brown.

Sarnosa Series

The Sarnosa series consists of deep, nearly level to sloping, calcareous loamy soils of the uplands. These soils formed in calcareous loamy material having thin strata of weakly cemented sandstone.

In a representative profile the surface layer is very dark gray fine sandy loam about 16 inches thick. Below this is about 18 inches of pale brown fine sandy loam and 18 inches of very pale brown sandy clay loam. The underlying material to a depth of 80 inches is very pale brown fine sandy loam.

These soils are well drained, and runoff is slow. Permeability is moderate. The available water capacity is medium.

These soils are used mostly for range. Some areas are in improved pasture. Some of the less sloping areas are farmed.

Representative profile of Sarnosa fine sandy loam, 3 to 5 percent slopes, 6.4 miles northwest on Farm Road 766 from the intersection of U.S. Highway 183 and Farm Road 766 in Cuero with a county road; then 3.4 miles northwest on a county road to a point 125 feet south of a small culvert across the county road and 75 feet east of the right-of-way; in range:

A—0 to 16 inches, very dark gray (10YR 3/1) fine sandy loam, black (10YR 2/1) moist; weak medium prismatic structure parting to moderate very fine granular; slightly hard, very friable; many fine roots; few worm casts; few snail shell fragments; 8 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

B21—16 to 34 inches, pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, very friable; common fine roots; about 3 percent common films and fine concretions of calcium carbonate; 29 percent calcium carbonate equivalent; few worm casts; calcareous; moderately alkaline; gradual smooth boundary.

B22ca—34 to 52 inches, very pale brown (10YR 7/3) sandy clay loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; hard, very friable; few films and about 12 percent common soft masses of calcium carbonate; 32 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

C1ca—52 to 70 inches, very pale brown (10YR 8/4) fine sandy loam, very pale brown (10YR 7/4) moist; massive; slightly hard, very friable; about 15 percent common soft masses and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

C2ca—70 to 80 inches, very pale brown (10YR 7/4) fine sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable; about 10 percent soft masses and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 64 inches thick. Depth to calcium carbonate segregations ranges from 24 to 40 inches. Weakly to strongly cemented sandstone is 60 to 100 inches below the surface.

The A horizon ranges from 10 to 20 inches in thickness. It is gray, dark gray, very dark gray, dark grayish brown, grayish brown, or very dark grayish brown. The texture is fine sandy loam or sandy clay loam.

The B horizon is grayish brown, light brownish gray, brown, pale brown, light yellowish brown, light brown, pink, or very pale brown. The texture is sandy clay loam or fine sandy loam.

The Cca horizon is very pale brown or light yellowish brown. The texture is fine sandy loam or sandy clay loam. In some places the C horizon is as much as 15 percent

weakly cemented, partly weathered sandstone fragments. The content of calcium carbonate in the form of concretions, films, threads, or soft masses ranges from 5 to 20 percent in the B22ca and C1ca horizons.

SaA—Sarnosa fine sandy loam, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from 8 to 120 acres or more in size. They are irregular in shape.

The surface layer is dark grayish brown fine sandy loam about 18 inches thick. Below this is about 30 inches of grayish brown sandy clay loam containing segregated calcium carbonate in the lower 10 inches. The underlying material to a depth of 60 inches is very pale brown sandy clay loam.

Included in some mapped areas are 1- to 4-acre areas of Runge, Weesatche, and Papalote soils. Included soils make up less than 12 percent of any one mapped area.

This Sarnosa soil is well suited to crops. About half the acreage is farmed. Many areas are in range. A few are in improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIc–1; Gray Sandy Loam range site; pasture and hayland group 8C.

SaB—Sarnosa fine sandy loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. Areas are irregular in shape and range from about 7 to 150 acres or more in size.

The surface layer is fine sandy loam about 12 inches thick. It is dark gray in the upper part and dark grayish brown in the lower part. The next layer, which extends to a depth of about 50 inches, is sandy clay loam. It is brown in the upper part and pale brown in the lower part. It has common calcium carbonate segregations below a depth of about 28 inches. The underlying material to a depth of 60 inches is light yellowish brown sandy clay loam.

Included in some mapped areas of this soil are small areas of soils that are similar to the Sarnosa soil, but have a dominantly thinner solum; some that have a lighter colored surface layer; some that are more clayey; and small areas of Sarnosa soils where slope is 0 to 1 percent. Included soils make up less than 12 percent of any one mapped area.

Most areas are used as range. Some are farmed. A few are in improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIe–3; Gray Sandy Loam range site; pasture and hayland group 8C.

SaC—Sarnosa fine sandy loam, 3 to 5 percent slopes. This gently sloping soil is on uplands. Areas are irregular in shape and range from about 8 to 150 acres in size. This soil has the profile described as representative of the Sarnosa series.

Included in some mapped areas of this soil are narrow 2- to 4-acre areas of Shiner, Heiden, and Crockett soils. Also included are a few small areas of a soil that is similar to this Sarnosa soil, but has a thinner solum and a lighter colored surface layer. Included soils make up less than 10 percent of any one mapped area.

Nearly all the acreage is used as range. A small acreage is in improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IIIe–8; Gray Sandy Loam range site; pasture and hayland group 8C.

SaD—Sarnosa fine sandy loam, 5 to 8 percent slopes. This sloping soil is on uplands. It is below the Shiner soils on ridgetops. Areas are 8 to 60 acres in size.

The surface layer is about 12 inches thick. It is dark gray fine sandy loam in the upper part and sandy clay loam in the lower part. Below this is 30 inches of brown sandy clay loam. The underlying material to a depth of 30 inches is very pale brown sandy clay loam containing common calcium carbonate segregations.

Included in some mapped areas are small areas of Shiner soils. Also included are soils that are similar but lighter colored. Included soils make up less than 10 percent of any mapped area.

This Sarnosa soil is poorly suited to crops. Nearly all areas are used for range. A few are used for improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IVe–7; Gray Sandy Loam range site; pasture and hayland group 8C.

SbC2—Sarnosa soils, 3 to 5 percent slopes, eroded. These gently sloping soils are on uplands. Areas are irregular in shape and range from 6 to 75 acres or more in size.

These soils are variable. Most mapped areas are Sarnosa fine sandy loam. In some mapped areas is a soil that is similar to the Sarnosa soil, but has a thinner, dark colored surface layer.

The surface layer is very dark gray fine sandy loam about 12 inches thick. Below this is 14 inches of brown sandy clay loam and 28 inches of pale brown sandy clay loam. The underlying material to a depth of 60 inches is light yellowish brown sandy clay loam.

Included in some mapped areas of this soil are gullies, about 125 to 250 feet apart, that are 1 to 3 feet deep and affect an area 5 to 15 feet wide. Also included are small areas of Heiden and Shiner soils. Included areas make up less than 10 percent of any mapped area.

These soils are poorly suited to crops. Most of the acreage is used as range. Scattered areas are in improved pasture. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit IVe–6; Gray Sandy Loam range site; pasture and hayland group 8C.

Shiner Series

The Shiner series consists of shallow, gently sloping to sloping, calcareous loamy soils of the uplands. These soils formed in calcareous loamy material that has thin strata of weakly cemented sandstone.

In a representative profile the surface layer is light brownish gray fine sandy loam about 6 inches thick. Below this is 10 inches of very pale brown gravelly fine sandy loam and 8 inches of yellow, weakly cemented, calcareous sandstone (fig. 3). The next 46 inches is very pale brown sandy loam that is 10 to 15 percent soft masses of calcium carbonate.

These soils are well drained and have moderate to rapid runoff. Permeability is moderate. The available water capacity is very low.

Most areas are used as range. A few scattered areas are improved pasture.

Representative profile of Shiner fine sandy loam, 1 to 5 percent slopes, 13.6 miles northwest on U.S. Highway 87 from its intersection with U.S. Highway 183 in

Figure 3.—**Profile of Shiner fine sandy loam showing weakly cemented sandstone at a depth of about 16 inches.**

Cuero to its intersection with a county road; 0.4 mile east on a paved county road to the top of a hill, then 275 feet east on the county road and 100 feet south; in range:

A—0 to 6 inches, light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; hard, friable, sticky; many worm casts; less than 5 percent soft calcareous sandstone fragments up to 1 centimeter in diameter; calcareous; moderately alkaline; clear irregular boundary.

B—6 to 16 inches, very pale brown (10YR 7/3) gravelly fine sandy loam, brown (10YR 5/3) moist; weak granular structure; hard, friable, sticky; about 25 percent calcareous sandstone fragments 1 to 3 centimeters in diameter; common soft masses of calcium carbonate; about 60 percent calcium carbonate equivalent; calcareous; moderately alkaline; abrupt wavy boundary.

C1—16 to 24 inches, yellow (10YR 7/6) weakly cemented sandstone thinly interbedded with lenses of very pale brown (10YR 8/3) fine sandy loam; weakly cemented chalky limestone and pockets of powdery calcium carbonate; about 35 to 40 percent sandstone layers; calcareous; moderately alkaline; gradual smooth boundary.

C2—24 to 70 inches, very pale brown (10YR 8/4) sandy loam, pale brown (10YR 6/3) moist; becomes stratified with sandy clay loam in the lower part; massive; very hard, friable; about 10 to 15 percent white soft powdery masses of calcium carbonate; about 40 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

The solum is 10 to 20 inches thick.

The A horizon is 4 to 10 inches thick. It is light brownish gray, brown, or pale brown.

The B horizon is 6 to 10 inches thick. It is light brownish gray, brown, pale brown, very pale brown, or light gray. The texture ranges from gravelly fine sandy loam to light sandy clay loam. The calcium carbonate equivalent ranges from 40 to 60 percent.

The C horizon, which is 10 to 20 inches below the surface, is weakly cemented, calcareous sandstone interbedded with fine sandy loam or sandy clay loam. It is very pale brown, light yellowish brown, brownish yellow, or yellow.

ShC—Shiner fine sandy loam, 1 to 5 percent slopes. This is a gently sloping soil on ridgetops in the uplands. It has the profile described as representative of the Shiner series. Areas range from 6 to 70 acres in size. They are irregular in shape.

Included in some mapped areas of this soil are small areas of a soil that has a thicker surface layer but is otherwise similar to this Shiner soil. Also included are small areas of eroded Shiner soils and small areas of Heiden and Sarnosa soils. Included soils make up less than 15 percent of any mapped area.

This soil is poorly suited to crops. Most areas are used as range. A few are improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IVe–4; Chalky Ridge range site; pasture and hayland group 14A.

ShD—Shiner fine sandy loam, 5 to 8 percent slopes. This is a sloping soil on ridgetops in the uplands. Areas range from 7 to 60 acres or more in size. They are irregular in shape.

The surface layer is pale brown fine sandy loam about 10 inches thick. Below this is about 4 inches of very pale brown fine sandy loam. The upper part of the underlying material is very pale brown, weakly cemented sandstone. The lower part grades to calcareous fine sandy loam that is 20 to 30 percent soft masses of calcium carbonate.

Included in some mapped areas of this soil are small areas of a soil that has a thicker solum but is otherwise similar to this Shiner soil; small areas of Heiden soils; and a few small areas of Shiner fine sandy loam where slopes are more than 8 percent. Included soils make up less than 12 percent of any mapped area.

This Shiner soil is used as range. Soil blowing is a slight hazard, and water erosion a severe hazard. Capability unit VIe–1; Chalky Ridge range site; pasture and hayland group 14A.

Silvern Series

The Silvern series consists of deep, gently sloping to sloping, noncalcareous very gravelly sandy soils of the uplands. These soils formed in ancient stream terraces or delta deposits of sand and gravel.

In a representative profile the surface layer is light brownish gray very gravelly loamy sand about 10 inches thick. Below this is about 44 inches of pinkish gray very gravelly loamy sand. The next layer is prominently and coarsely mottled light brown, white, and yellowish red, firm very gravelly sandy clay loam in

the upper 8 inches and dark red very gravelly sandy clay loam mottled with light gray in the lower 14 inches. The underlying material to a depth of 100 inches is yellowish brown gravelly sandy clay loam mottled with light gray and dark red.

These soils are well drained and have very slow runoff. Permeability is moderate, and the available water capacity is very low.

Silvern soils are used for range and as a source of gravel (fig. 4).

Representative profile of Silvern very gravelly loamy sand in an area of Silvern-Ellen complex, 1 to 8 percent slopes, 7.1 miles southeast on U.S. Highway 87 from the intersection of U.S. Highways 87 and 183 in Cuero to its intersection with a county road; then 2.4 miles east and northeast on a county road to the crest of a small ridge and 10 feet south of road right-of-way:

A11—0 to 10 inches, light brownish gray (10YR 6/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; weak very fine granular structure; soft, very friable; many fine and very fine roots; 60 percent well-graded siliceous pebbles; 9 percent cobbles; medium acid; clear smooth boundary.

A12—10 to 22 inches, pinkish gray (7.5YR 6/2) very gravelly loamy sand, brown (7.5YR 5/2) moist; weak very fine granular structure; soft, very friable; common fine roots; 51 percent well-graded siliceous pebbles; 27 percent cobbles; medium acid; clear smooth boundary.

A2—22 to 54 inches, pinkish gray (7.5YR 7/2) very gravelly loamy sand, brown (7.5YR 5/4) moist; weak fine and very fine subangular blocky structure; slightly hard, firm; few fine and medium roots; 62 percent siliceous pebbles, mostly 1 to 3 inches in diameter, and 10 percent cobbles; strongly acid; clear wavy boundary.

B21t—54 to 62 inches, prominently and coarsely mottled yellowish red (5YR 5/8), light brown (7.5YR 6/4), and white (10YR 8/1) very gravelly sandy clay loam; weak fine and very fine subangular blocky structure; hard, firm, sticky and slightly plastic; few fine roots; about 5 percent plinthite that occurs mainly in the red mottled areas; common thick clay films on faces of peds and in pores; 50 percent siliceous pebbles; 11 percent cobbles; very strongly acid; gradual wavy boundary.

B22t—62 to 76 inches, dark red (10R 3/6) very gravelly sandy clay loam; common medium prominent light gray (10YR 7/2) mottles; moderate fine and very fine subangular blocky structure; hard, firm, sticky and slightly plastic; very few fine roots; common thin clay films; fine earth fraction is about 40 percent red masses that are 10 percent plinthite and occur as coatings on coarse fragments; 54 percent siliceous pebbles; 9 percent cobbles; very strongly acid; gradual smooth boundary.

IIC—76 to 100 inches, yellowish brown (10YR 5/8) gravelly sandy clay loam in aggregated matrix and light gray (10YR 7/2) very firm plastic clay and dark red (10YR 3/6) firm reticulate masses and plates coating coarse fragments; massive; 23 percent siliceous pebbles; very strongly acid.

Figure 4.—**Profile of Silvern soils showing the well-graded gravel throughout the soil profile.**

The solum is 60 to 100 inches thick.

The A horizon ranges from 40 to 80 inches in thickness. It is light brownish gray, pinkish gray, pale brown, or very pale brown. It is very gravelly loamy sand or very gravelly sand that is 60 to 90 percent siliceous pebbles and cobbles. Reaction is slightly acid through strongly acid.

The Bt horizon is dominantly yellowish red or dark red and has medium and coarse mottles in shades of gray, brown, and red. It is gravelly or very gravelly sandy clay loam or gravelly or very gravelly sandy loam. The content of siliceous pebbles and cobbles ranges from 35 to 80 percent. The upper 20 inches is 18 to 35 percent clay. The B21t horizon is 5 to 15 percent plinthite, which occurs mainly with the red mottles. Reaction is strongly acid or extremely acid. Base saturation ranges from 20 to 70 percent by sum of cations. It is more than 35 percent in some parts within 70 inches of the soil surface.

The C horizon is prominently mottled with red, yellow, brown, or gray and ranges from very gravelly sandy clay loam through gravelly sandy loam. The fine earth fraction in the lower Bt and the C horizons is 15 to 50 percent reticulate, red, firm to brittle masses containing plinthite and coatings on coarse fragments.

SkD—Silvern-Ellen complex, 1 to 8 percent slopes. This gently sloping to sloping mapping unit is on uplands. It is dominantly about 50 percent Silvern gravelly loamy sand and 40 percent Ellen gravelly loamy sand. In some areas the percentage of the Silvern soil ranges from 40 to 80 and the percentage of the Ellen soil from 20 to 60. Areas range from about 15 to 300 acres or more in size and are oval in shape.

Included with these soils in mapping are areas of Tremona and Straber soils. Also included is a soil similar to the Ellen soil that has a very gravelly surface layer but is less than 35 percent gravel fragments in the upper part of the B2t horizon. Included soils make up less than 10 percent of any one mapped area.

This mapping unit is used as range and as a source of gravel. The hazards of soil blowing and water erosion are slight. Capability unit VIs–2; Gravelly range site.

Sinton Series

The Sinton series consists of deep, nearly level, calcareous loamy soils of the bottom land. These soils formed in calcareous loamy stratified sediments.

In a representative profile the surface layer is dark grayish brown loam about 7 inches thick. Below this is about 19 inches of dark grayish brown sandy clay loam. The underlying material is pale brown loam to a depth of 46 inches and very pale brown loam to a depth of 84 inches.

These soils are well drained and have slow runoff. Permeability is moderate, and the available water capacity is medium.

Most areas are used for improved pasture. A few are farmed, and a few are used for range.

Representative profile of Sinton loam, 12 miles southeast on U.S. Highway 87 from the intersection of U.S. Highways 87 and 183 in Cuero; 1.95 miles west on a paved county road to a fence corner; 120 feet north of road along fence; 25 feet east of fence; in a field:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; very hard, very friable; common fine roots; calcareous; moderately alkaline; clear smooth boundary.

A11—7 to 16 inches, dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; very hard, very friable; common fine roots; calcareous; moderately alkaline; gradual wavy boundary.

A12—16 to 26 inches, dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable; common fine roots; few snail shell fragments; calcareous; moderately alkaline; gradual smooth boundary.

C1—26 to 46 inches, pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; very hard, very friable; few small snail shell fragments; calcareous; moderately alkaline; gradual smooth boundary.

C2—46 to 84 inches, very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; very hard, very friable; few snail shell fragments; calcareous; moderately alkaline.

The A horizon is 22 to 35 inches thick. It is very dark gray, dark grayish brown, very dark grayish brown, or dark gray. The C horizon is pale brown, very pale brown, light gray, light brownish gray, or white. It is loam, fine sandy loam, or sandy clay loam. Bedding planes and lenses of these various textures are evident.

Sn—Sinton loam. This nearly level soil is on bottom land. Some areas are seldom if ever flooded. Others are flooded for 1 or 2 days on the average of once or twice every 10 years. Slopes are mainly less than 1 percent.

Included in some mapped areas of this soil are low narrow areas of Meguin soils. Included soils make up less than 8 percent of any mapped area.

This Sinton soil is well suited to crops, improved pasture, and pecans. Most areas are improved pasture, and some are farmed. Only a few areas are used for range. Capability unit IIw–2; Loamy Bottomland range site; pasture and hayland group 2A.

Straber Series

The Straber series consists of deep, nearly level to gently sloping, noncalcareous sandy soils of the uplands. These soils formed in clayey to loamy material.

In a representative profile the surface layer is pale brown loamy fine sand about 8 inches thick. Below this is about 6 inches of very pale brown loamy fine sand. The subsoil to a depth of 48 inches is light yellowish brown sandy clay mottled with light gray in the upper part and light gray sandy clay mottled with yellowish brown in the lower part. Below this is about 6 inches of light gray clay loam mottled with red. The underlying material is very pale brown sandy clay loam to a depth of 78 inches and yellow sandy clay loam to a depth of 86 inches.

These soils are moderately well drained and have slow to medium runoff. Permeability is slow, and the available water capacity is medium.

These soils are used mainly for range. They are poorly suited to crops. A few areas are improved pasture.

Representative profile of Straber loamy fine sand, 1 to 5 percent slopes, 11 miles northeast from the intersection of U.S. Highway 183 and Farm Road 1447 in Cuero on Farm Road 1447 to its intersection with Farm Road 682, 2.3 miles southeast on Farm Road 682 to a cattle guard, 600 feet southeast of the cattle guard to an oil well and 300 feet south-southwest of the oil well; in range:

A1—0 to 8 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; weak fine granular structure; loose, very friable; common fine roots; about 5 percent of siliceous pebbles; medium acid; clear smooth boundary.

A2—8 to 14 inches, very pale brown (10YR 7/3) loamy fine sand, pale brown (10YR 6/3) moist; single grained; loose, very friable; few fine roots; few siliceous pebbles; medium acid; abrupt wavy boundary.

B21t—14 to 24 inches, light yellowish brown (10YR 6/4) sandy clay, yellowish brown (10YR 5/4) moist; common medium distinct light gray (10YR 7/2) mottles; weak medium angular blocky structure parting to weak very fine subangular blocky; extremely hard, very firm, sticky and plastic; few fine roots; few fine siliceous pebbles; common clay films; strongly acid; gradual wavy boundary.

B22t—24 to 48 inches, light gray (2.5Y 7/2) sandy clay, light brownish gray (2.5Y 6/2) moist; few fine distinct yellowish brown (10YR 5/4) mottles; weak coarse angular blocky structure; extremely hard, very firm, sticky and plastic; many clay films, about 15 percent siliceous pebbles; strongly acid; gradual wavy boundary.

B3—48 to 54 inches, light gray (2.5Y 7/2) clay loam, light brownish gray (2.5Y 6/2) moist; common coarse prominent red (2.5YR 4/6) mottles; weak coarse angular blocky structure; extremely hard, very firm, sticky and plastic; few thin clay films; neutral; gradual wavy boundary.

IIC1ca—54 to 78 inches, very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; massive; very hard, firm; about 20 percent soft masses of calcium carbonate; calcareous; moderately alkaline; clear smooth boundary.

IIC2ca—78 to 86 inches, yellow (10YR 7/6) sandy clay loam, brownish yellow (10YR 6/6) moist; massive; hard, firm; about 30 percent soft masses of calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 70 inches thick. Base saturation in the upper part of the B2t horizon is 40 to 75 percent by sum of cations.

The A horizon is 10 to 20 inches thick. It is light gray, light brownish gray, grayish brown, dark grayish brown, brown, pale brown, or very pale brown. It is slightly acid or medium acid.

The B2t horizon is light gray, brown, pale brown, light yellowish brown, brownish yellow, or yellowish brown. Mottles are in shades of red, brown, yellow, and gray. The texture is clay or sandy clay. The upper 20 inches of the Bt horizon is 35 to 50 percent clay. Reaction is strongly acid or very strongly acid.

The B3 horizon is light gray, light yellowish brown, or yellowish brown mottled with red, yellow, brown, gray, and olive. It is sandy clay, clay loam, or sandy clay loam. Reaction ranges from medium acid through mildly alkaline.

The IICca horizons are white, light gray, brown, very pale brown, light yellowish brown, yellow, or brownish yellow. They are sandy clay, clay loam, or sandy clay loam. Soft masses of calcium carbonate range up to 40 percent, by volume.

StA—Straber loamy fine sand, 0 to 1 percent slopes. This nearly level soil is on uplands. Areas range from about 8 to 75 acres or more in size. They are irregular in shape.

The surface layer is very pale brown loamy fine sand about 14 inches thick. The upper part of the subsoil is brownish yellow clay mottled with reddish brown and light gray. The lower part is light gray sandy clay mottled with red and brownish yellow. The underlying material is brownish yellow and light gray sandy clay mottled with light brownish gray.

Included in some mapped areas of this soil are 1- to 4-acre areas of Tremona and Crockett soils. Included soils make up less than 8 percent of any mapped area.

This soil is poorly suited to crops. It is best suited to range, and most areas are used as range. Soil blowing is a moderate hazard, and water erosion a slight hazard. Capability unit IIIs–1; Sandy range site; pasture and hayland group 9A.

StC—Straber loamy fine sand, 1 to 5 percent slopes. This gently sloping soil is on uplands. It has the profile described as representative of the Straber series. Areas range from 10 to 90 acres or more in size and are irregular in shape.

Included in some mapped areas of this soil are 1- to 5-acre areas of Tremona and Crockett soils. Included soils make up less than 12 percent of any mapped area.

This soil is poorly suited to crops. It is used mainly for range. A few areas are in improved pasture. Soil blowing and water erosion are moderate hazards. Capability unit IIIe–1; Sandy range site; pasture and hayland group 9A.

Tremona Series

The Tremona series consists of deep, nearly level to gently sloping, noncalcareous sandy soils of the uplands. These soils formed in interbedded clayey to loamy material.

In a representative profile the surface layer is pale brown loamy fine sand about 12 inches thick. Below this is about 16 inches of very pale brown loamy fine sand, 12 inches of gray sandy clay mottled with dark yellowish brown and red, 18 inches of light gray sandy clay mottled with yellowish brown and yellowish red, and 10 inches of white sandy clay loam mottled with yellowish brown and yellowish red. The underlying material is white sandy clay loam mottled with strong brown.

These soils are somewhat poorly drained and have slow to very slow runoff. Permeability is very slow, and the available water capacity is low.

Most areas are used for range. A few are improved pasture.

Representative profile Tremona loamy fine sand, 0 to 5 percent slopes, 4.4 miles southeast from the intersection of U.S. Highway 77A and U.S. Highway 87 in Cuero, on U.S. Highway 87 to a county road, 3.5 miles northeast on a county road and 50 feet north of road right-of-way; in range:

A1—0 to 12 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose, very friable; common fine roots; few fine siliceous pebbles; slightly acid; clear smooth boundary.

A2—12 to 28 inches, very pale brown (10YR 7/3) loamy fine sand, pale brown (10YR 6/3) moist; common medium distinct light yellowish brown (10YR 6/4) mottles; single grained; loose, very friable; few fine roots; common fine siliceous pebbles in the upper part that increase to 30 percent in the lower 2 inches; slightly acid; abrupt wavy boundary.

B21t—28 to 40 inches, gray (10YR 6/1) sandy clay, gray (10YR 5/1) moist; common medium distinct dark yellowish brown (10YR 4/4) and common medium prominent red (2.5YR 4/8) mottles; moderate medium blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; few plinthite masses within the red mottled area; nearly continuous clay films; about 10 percent fine siliceous pebbles; strongly acid; gradual wavy boundary.

B22t—40 to 58 inches, light gray (10YR 7/1) sandy clay, gray (10YR 6/1) moist; common coarse distinct yellowish brown (10YR 5/6) and few fine prominent yellowish red (5YR 5/8) mottles; weak medium blocky structure; extremely hard, very firm, sticky and plastic; few plinthite masses within the red mottled areas; continuous clay films; about 5 percent fine and medium siliceous pebbles; medium acid; gradual wavy boundary.

B3—58 to 68 inches, white (10YR 8/2) sandy clay loam, light gray (10YR 7/2) moist; common coarse distinct yellowish brown (10YR 5/8) and few fine prominent yellowish red (5YR 5/8) mottles; weak coarse blocky structure; extremely hard, firm, slightly sticky; few fine calcium carbonate concretions; mildly alkaline; diffuse wavy boundary.

C—68 to 84 inches, white (10YR 8/2) moist sandy clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; very hard, friable; few soft masses and few fine concretions of calcium carbonate; calcareous; moderately alkaline.

The solum is 60 to 80 inches thick.

The A1 horizon is 8 to 16 inches thick. The color is grayish brown, light gray, very pale brown, or pale brown. The texture is loamy fine sand or gravelly loamy sand. Reaction ranges from slightly acid through strongly acid. Gravel content ranges up to 50 percent by volume.

The A2 horizon is 10 to 22 inches thick. The color is light gray, pale brown, or very pale brown. Reaction ranges from slightly acid to medium acid.

The B21t horizon is 8 to 20 inches thick. The color is dark gray, light gray, gray, or light brownish gray. The mottling is in shades of red, brown, yellow, or gray. The texture ranges from sandy clay to clay. Reaction ranges from very strongly acid to medium acid.

The B22t horizon is 9 to 20 inches thick. The color is light gray, gray, or light brownish gray. The mottling is in shades of red, yellow, brown, or gray. The texture ranges from sandy clay to clay. Reaction ranges from medium acid to very strongly acid.

In the B3 horizon, the mottling is in shades of red, brown, yellow, or gray. The texture ranges from sandy clay loam to sandy clay. Reaction ranges from strongly acid through mildly alkaline.

The C horizon ranges from reddish yellow to very pale brown to white. The texture ranges from sandy clay loam to

clay loam. Reaction ranges from strongly acid through moderately alkaline.

TeC—Tremona loamy fine sand, 0 to 5 percent slopes. This gently sloping soil is on uplands. Areas range from 15 to 300 acres or more in size. They are irregular in shape. This soil has the profile described as representative of the Tremona series.

Included in some mapped areas of this soil are 1- to 4-acre areas of Catilla, Straber, and Tremona gravelly soils. Included soils make up less than 12 percent of any mapped area.

This soil is poorly suited to crops. Nearly all areas are used for range. Some are improved pasture. Soil blowing and water erosion are moderate hazards. Capability unit IIIe–6; Sandy range site; pasture and hayland group 9A.

TgC—Tremona gravelly loamy sand, 1 to 5 percent slopes. This gently sloping soil is on uplands. Areas are irregular in shape and range from 8 to 300 acres or more in size.

The surface layer is very pale brown gravelly loamy sand about 32 inches thick. The next 32 inches is light gray clay mottled with dark red. The underlying material to a depth of about 80 inches is light gray sandy clay loam mottled with dark red.

Included in some mapped areas of this soil are 1- to 4-acre areas of Silvern and Ellen soils and Tremona loamy fine sand. Included soils make up less than 12 percent of any mapped area.

This soil is poorly suited to crops. It is best suited to range. Nearly all areas are used as range. A few are used as improved pasture. A few small scattered areas have been mined for gravel. Soil blowing and water erosion are moderate hazards. Capability unit IVs–2; Gravelly range site; pasture and hayland group 9A.

Trinity Series

The Trinity series consists of deep, nearly level, calcareous clayey soils of the bottom land. These soils formed in calcareous clayey alluvium.

In a representative profile the surface layer is dark gray clay about 64 inches thick. The underlying material to a depth of 82 inches is gray clay.

These soils are somewhat poorly drained, and runoff is very slow. Permeability is very slow, and the available water capacity is high.

Most areas are used for range. A few are farmed. Some are used for improved pasture.

Representative profile of Trinity clay, occasionally flooded, 4 miles northwest on Farm Road 766 from the intersection of U.S. Highway 183 and Farm Road 766 in Cuero; then 2.8 miles west on Farm Road 953 and 0.9 mile west on a county road to a gate; 2,300 feet north-northeast along fence and 100 feet east of fence; in range:

A11—0 to 36 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium and fine subangular blocky structure; very hard, very firm, sticky, very plastic; common fine roots; few small snail shell fragments; calcareous; moderately alkaline; gradual wavy boundary.

A12—36 to 64 inches, dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; weak medium and fine subangular blocky structure; few slickensides that do not intersect; extremely hard, very firm, very sticky and plastic; few fine roots; few fine calcium carbonate concretions; calcareous; moderately alkaline; clear smooth boundary.

C—64 to 82 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; massive; extremely hard, extremely firm, sticky, plastic; few fine calcium carbonate concretions; few snail shell fragments; calcareous; moderately alkaline.

The Ap and A11 horizons range from 12 to 44 inches in thickness. They are dark gray or very dark gray.

The A12 horizon is 16 to 30 inches thick. It is dark gray or very dark gray.

The C horizon ranges from gray, pale brown, dark gray, or light brownish gray. The texture is clay or silty clay.

To—Trinity clay, occasionally flooded. This nearly level soil is on flood plains of the major streams of the county. Slopes are 0 to 1 percent. This soil is at lower elevations on the flood plain than Meguin or Degola soils. It is flooded one to three times in 4- to 10-year intervals. Areas range from 15 to 170 acres or more in size. They are mostly narrow and long in shape. This soil has the profile described as representative for the Trinity series.

Included in some mapped areas of this soil are 1- to 3-acre areas of Degola and Meguin soils and small areas of Trinity clay where slope is up to 3 percent. Included soils make up less than 12 percent of any mapped area.

This soil is used mostly for range. It is suited to crops, and a few areas are farmed. A few are improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIw–1; Clayey Bottomland range site; pasture and hayland group 1A.

Tr—Trinity clay, frequently flooded. This nearly level soil is on flood plains of major streams of the county. It occupies lower positions on the landscape than Meguin and Degola soils. Slopes are 0 to 1 percent. Areas range from 20 to 170 acres or more in size. They are long and narrow in shape.

The surface layer is dark gray clay about 60 inches thick. The underlying material to a depth of 70 inches is pale brown clay.

Included in some mapped areas of this soil are 1- to 3-acre areas of Meguin soil and narrow areas of Trinity clay where slope is 1 to 3 percent. Included soils make up less than 15 percent of any mapped area.

This soil is flooded twice in most years.

Most areas are used for range. A few are improved pasture. Soil blowing and water erosion are slight hazards. Capability unit Vw–1; Clayey Bottomland range site; pasture and hayland group 1A.

Valco Series

The Valco series consists of shallow, gently sloping to sloping loamy soils of the uplands. These soils formed in calcareous loamy sediments.

In a representative profile the surface layer is dark grayish brown sandy clay loam about 10 inches thick. Below this is about 5 inches of pale brown to white strongly cemented caliche that is weakly laminar in the upper part. It is underlain by very pale brown to white, soft, powdery to weakly cemented caliche.

These soils are well drained. Permeability is moderate. Runoff is slow to medium, and the available water capacity is very low.

These soils are used for range. A few areas have been mined for caliche for road material.

Representative profile of Valco sandy clay loam, 1 to 8 percent slopes, 26 miles southwest of Cuero via U.S. Highway 87 and Texas Highway 72 to the intersection of Texas Highway 72 and Farm Road 239 in Nordheim, 3.4 miles southeast on Farm Road 239; 3.0 miles southwest on a county road, 1.0 mile southeast on a county road; 0.2 mile northeast on a county road to the northwest edge of a caliche pit, 50 feet northwest of the northwest corner of a caliche pit and 20 feet east of the county road, at the base of an agarita bush about 4 feet high:

A1—0 to 10 inches, dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; strong very fine subangular blocky structure; very hard, very friable; common fine roots; few rounded siliceous pebbles and pieces of broken calcium carbonate concretions and snail shells; calcareous; moderately alkaline; clear smooth boundary.

C1cam—10 to 15 inches, pale brown (10YR 6/3) to white (10YR 8/2) strongly cemented caliche that is weakly laminar in the upper part; contains a few old solution channels; calcareous; moderately alkaline; abrupt smooth boundary.

C2cam—15 to 84 inches, very pale brown (10YR 7/3) to white (10YR 8/2) soft powdery to weakly cemented caliche; calcareous; moderately alkaline.

The A horizon ranges from 10 to 18 inches in thickness. It is brown, dark grayish brown, very dark grayish brown, or dark gray. The content of siliceous pebbles ranges from none to 10 percent, by volume.

The C1cam horizon is 4 to 8 inches thick and pale brown or very pale brown.

The C2cam horizon ranges from 10 to 20 inches below the surface and is pale brown or very pale brown.

VaD—Valco sandy clay loam, 1 to 8 percent slopes. This is a sloping to sloping soil on ridgetops in the uplands. Areas are 10 to 50 acres or more in size and oval to long in shape.

Included in some mapped areas of this soil are areas where the soil is underlain by weakly cemented calcium carbonate and a few very small areas where the surface layer is noncalcareous. Included soils make up less than 12 percent of any mapped area.

This soil is poorly suited to crops. Most areas are used as range. A few small areas have been used as a source of caliche for road material. Soil blowing and water erosion are moderate hazards. Capability unit IVs–1; Shallow range site; pasture and hayland group 13A.

Weesatche Series

The Weesatche series consists of deep, gently sloping, noncalcareous loamy soils of the uplands. These soils formed in loamy sediments.

In a representative profile the surface layer is dark gray sandy clay loam about 8 inches thick. The subsoil is about 22 inches of sandy clay loam. The upper part is dark grayish brown, and the lower part is reddish brown with red mottles. Below this is 8 inches of reddish yellow sandy clay loam and 22 inches of pink loam. The underlying material is white loamy earth that is thinly stratified with weakly cemented sandstone.

These soils are well drained and have medium runoff. Permeability is moderate, and the available water capacity is high.

These soils are used mainly for range. Several areas are farmed, and a few are improved pasture.

Representative profile of Weesatche sandy clay loam, 1 to 3 percent slopes, 4.8 miles south on Texas Highway 119 from the intersection of Texas Highways 72 and 119 in Yorktown; then 3.0 miles south and 2.4 miles southwest on a county road and 20 feet northwest of road right-of-way; in range:

A1—0 to 8 inches, dark gray (10YR 4/1) sandy clay loam, very dark gray (10YR 3/1) moist; weak fine subangular blocky and granular structure; slightly hard, friable; common fine roots; common fine pores, mildly alkaline; clear smooth boundary.

B1t—8 to 17 inches, dark grayish brown (10YR 4/2) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to weak fine subangular blocky; very hard, firm, slightly sticky; common fine roots; few thin clay films on faces of peds; about 15 percent fine siliceous pebbles; calcareous; moderately alkaline; clear smooth boundary.

B2t—17 to 30 inches, reddish brown (5YR 5/3) sandy clay loam, reddish brown (5YR 4/3) moist; common medium distinct red (2.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; extremely hard, very firm, slightly sticky; few fine roots between peds, common thick clay films on faces of peds and in pores; about 8 percent fine siliceous pebbles; calcareous; moderately alkaline; gradual smooth boundary.

B3ca—30 to 38 inches, reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; few medium distinct red mottles; weak medium angular blocky structure; very hard, firm, slightly sticky; few fine roots; about 8 percent calcium carbonate segregated in soft masses; 15 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

C1ca—38 to 50 inches, pink (7.5YR 7/4) loam, brown (7.5YR 5/4) moist; massive; very hard, friable; about 25 percent soft masses and concretions of calcium carbonate; 60 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

C2ca—50 to 84 inches, white (10YR 8/2) loamy earth that becomes thinly stratified with weakly cemented very fine sandstone in the lower part; massive; dense; calcareous; moderately alkaline.

The solum is 30 to 56 inches thick.

The A horizon ranges from 6 to 16 inches in thickness. The color is very dark gray, dark gray, very dark grayish brown, or grayish brown. Reaction ranges from neutral to mildly alkaline.

The B1t horizon ranges from 8 to 12 inches in thickness. The color is reddish brown, dark grayish brown, very dark grayish brown, or brown. The texture ranges from sandy clay loam to clay. Reaction ranges from neutral to moderately alkaline.

The B2t horizon ranges from 8 to 18 inches in thickness. The color is reddish brown, yellowish red, light brown, or brown. The texture ranges from silty clay loam to clay loam.

The B3ca horizon ranges from 6 to 18 inches in thickness. The color is light reddish brown, reddish brown, yellowish red, reddish yellow, or light brown. The texture ranges from clay loam to sandy clay loam.

The C horizon is white, yellowish red, pink, or very pale brown. The texture ranges from fine sandy loam to silty clay loam. The content of soft masses of calcium carbonate ranges from a few to 40 percent, by volume.

WeB—Weesatche sandy clay loam, 1 to 3 percent slopes. This is a gently sloping soil on uplands. It has the profile described as representative of the Weesatche series. Areas range from 7 to 150 acres or more in size and are irregular in shape.

Included in some mapped areas of this soil are 1- to

3-acre areas of Papalote, Miguel, Runge, Sarnosa, Shiner, and Leming soils. Included soils make up less than 12 percent of any mapped area.

This soil is used mainly as range. Soil blowing is a slight hazard, and water erosion a moderate hazard. Several areas are farmed, and a few are improved pasture. Capability unit IIe–3; Clay Loam range site; pasture and hayland group 7C.

WeC—Weesatche sandy clay loam, 3 to 5 percent slopes. This gently sloping soil is on uplands. Areas range from 10 to 120 acres or more in size. They are irregular in shape.

The surface layer is very dark grayish brown sandy clay loam about 12 inches thick. The upper 14 inches of the subsoil is yellowish red sandy clay loam. The lower 20 inches is light brown firm sandy clay loam containing common soft masses of calcium carbonate. The underlying material is pink calcareous loam with many soft masses of calcium carbonate.

Included in some mapped areas of this soil are 1- to 4-acre areas of Miguel, Sarnosa, Runge, and Shiner soils. Included soils make up less than 15 percent of any mapped area.

Most areas are used as range. A few are farmed, and a few are improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIIe–7; Clay Loam range site; pasture and hayland group 7C.

Wilson Series

The Wilson series consists of deep, nearly level to gently sloping loamy soils of the uplands. These soils formed in clayey old alluvium.

In a representative profile the surface layer is dark gray clay loam about 8 inches thick. The subsoil is about 54 inches of clay. The upper 15 inches is very dark gray, the next 17 inches is gray, and the lower 22 inches is light gray. The underlying material to a depth of 84 inches is pale brown clay.

These soils are somewhat poorly drained and have very slow to medium runoff. Permeability is very slow, and the available water capacity is medium.

Most areas are used for range. Some are farmed, and a few are improved pasture.

Representative profile of Wilson clay loam, 1 to 3 percent slopes, 9.25 miles north on U.S. Highway 183 from the intersection of U.S. Highways 87 and 183 in Cuero; then 0.3 mile east of highway; in range:

A1—0 to 8 inches, dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure; very hard, firm; common fine roots; slightly acid; abrupt wavy boundary.

B21tg—8 to 23 inches, very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium angular blocky structure; extremely hard, extremely firm, very sticky and plastic; few fine roots; many clay films; slightly acid; gradual wavy boundary.

B22tg—23 to 40 inches, gray (10YR 5/1) clay, very dark gray (10YR 3/1) moist; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and plastic; few fine roots; common thin clay films; mildly alkaline; diffuse wavy boundary.

B3tg—40 to 62 inches, light gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; weak coarse angular blocky structure; very hard, very firm, sticky; few clay films; few fine weakly cemented calcium carbonate concretions; few fine ferromanganese concretions; calcareous; moderately alkaline; gradual smooth boundary.

C—62 to 84 inches, pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; massive; very hard, very firm, very sticky; 5 percent soft masses of weakly cemented calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 75 inches thick.

The A1 horizon ranges from 4 to 10 inches in thickness. It ranges from very dark gray to dark gray. Reaction ranges from slightly acid to mildly alkaline.

The B21tg horizon ranges from 12 to 30 inches in thickness. It ranges from very dark gray to dark gray. The texture ranges from clay loam to clay. Reaction ranges from slightly acid to mildly alkaline.

The B22tg horizon ranges from 10 to 18 inches in thickness. It ranges from dark gray to gray. Reaction is neutral or mildly alkaline.

The B3t horizon ranges from 8 to 22 inches in thickness. It ranges from light gray or gray to grayish brown. The texture ranges from sandy clay to clay. Reaction ranges from neutral to moderately alkaline.

The C horizon ranges from 40 to 64 inches below the surface. It ranges from gray or light gray to brown.

WsA—Wilson clay loam, 0 to 1 percent slopes. This nearly level soil is on uplands, at lower positions on the landscape. Areas range from about 10 to 100 acres or more in size. They are irregular in shape.

The surface layer is dark gray clay loam about 9 inches thick. Below this is about 25 inches of very dark gray clay and about 10 inches of gray clay. The underlying material is gray clay.

Included in some mapped areas of this soil are 1- to 3-acre areas of Crockett, Heiden, and Cuero soils. Included soils make up less than 12 percent of any mapped area.

Most areas are used as range. Some are farmed, and a few are improved pasture. Soil blowing and water erosion are slight hazards. Capability unit IIIw–3; Claypan Prairie (BL) range site; pasture and hayland group 7H.

WsB—Wilson clay loam, 1 to 3 percent slopes. This gently sloping soil is on uplands. It has the profile described as representative of the Wilson series. Areas range from 10 to 120 acres or more in size. They are irregular in shape.

Included in some mapped areas of this soil are 1- to 4-acre areas of Crockett, Heiden, and Cuero soils. Included soils make up less than 15 percent of any mapped area.

This soil is mainly used as range. A few areas are farmed, and a few are improved pasture. Soil blowing is a slight hazard, and water erosion a moderate hazard. Capability unit IIIe–10; Claypan Prairie (BL) range site; pasture and hayland group 7H.

Zalla Series

The Zalla series consists of deep, nearly level, calcareous sandy soils of the bottom land. These soils formed in sandy alluvial sediments that have been reworked by wind.

In a representative profile the surface layer is very pale brown fine sand about 10 inches thick. Below this is 4 inches of grayish brown loamy sand, 10 inches of very pale brown sand, 8 inches of pale brown sandy loam, and 8 inches of pale brown loamy fine sand. The

underlying material to a depth of 62 inches is very pale brown sand.

These soils are somewhat excessively drained, and runoff is slow. Permeability is rapid, and available water capacity is low. The soils are flooded occasionally for brief periods.

These soils are used for range.

Representative profile of Zalla fine sand, occasionally flooded, 14 miles south on U.S. Highways 183 and 77A from the intersection of this highway and U.S. Highway 87 in Cuero to the bridge across Coleto Creek; then 0.3 mile south-southeast to a clump of large live oak trees, and 100 feet southwest from the southwest corner of the clump; in range:

A11—0 to 10 inches, very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose, very friable; common roots; few fine snail shell fragments; few fine siliceous pebbles; calcareous; moderately alkaline; abrupt smooth boundary.

A12b—10 to 14 inches, grayish brown (10YR 5/2) loamy sand, dark grayish brown (10YR 4/2) moist; single grained; loose, very friable; common roots; small limestone pebbles and very few siliceous pebbles up to 5 millimeters in diameter; calcareous; moderately alkaline; abrupt smooth boundary.

C1b—14 to 24 inches, very pale brown (10YR 8/3) sand, pale brown (10YR 6/3) moist; single grained; loose; common roots; calcareous; moderately alkaline; abrupt smooth boundary.

IIAb—24 to 32 inches, pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; single grained; slightly hard, very friable, slightly sticky; few fine threads of calcium carbonate; few fine snail shell fragments; few siliceous pebbles; calcareous; moderately alkaline; abrupt smooth boundary.

IIC1b—32 to 40 inches, pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; calcareous; moderately alkaline; abrupt smooth boundary.

IIC2b—40 to 58 inches, very pale brown (10YR 7/3) sand, pale brown (10YR 6/3) moist; single grained; loose, very friable; calcareous; moderately alkaline; abrupt smooth boundary.

IIC3b—58 to 62 inches, very pale brown (10YR 8/3) sand, pale brown (10YR 6/3) moist; single grained; loose, very friable; calcareous; moderately alkaline.

The A horizon is 5 to 20 inches thick. It is very pale brown, grayish brown, light brownish gray, pale brown, or brown. The texture is sand, fine sand, or loamy fine sand.

The C horizon has the same colors as the A horizon. Many pedons have a dark colored buried horizon. Strata in the C horizon are 1 inch to 40 inches thick. The weighted average clay content at a depth of 10 to 40 inches ranges from 3 to 10 percent. Individual strata are sandy or loamy.

Za—Zalla fine sand, occasionally flooded. This nearly level soil is on flood plains of minor and major creeks of the county. Areas are long in shape and range from 10 to 300 acres or more in size. Slopes are 0 to 1 percent.

Included in some mapped areas of this soil are 1- to 7-acre areas of a soil that is coarser textured throughout but is otherwise similar to this Zalla soil; 2- to 8-acre areas of a soil that is finer textured throughout but is otherwise similar to this Zalla soil; and 1- to 6-acre areas of soils having a noncalcareous surface layer and noncalcareous strata within a depth of 50 inches. Included soils make up less than 15 percent of any one mapped area.

This soil is poorly suited to crops and is used mostly as range. It is flooded once in 1 to 10 years. Soil blowing is a moderate hazard, and water erosion a slight hazard. Capability unit IVw–1; Loamy Bottomland range site; pasture and hayland group 3A.

Use and Management of the Soils

The soils of De Witt County are used mainly for range, crops, improved pasture, wildlife habitat, and recreational facilities. The following pages explain the system of capability classification adopted by the Soil Conservation Service, suggest management of the soils by capability units, and list predicted yields of specified crops. Also on the pages that follow is information on pasture and hay crops, range, and wildlife habitat and on selected uses of the soils for recreational facilities and for dwellings, local roads and streets, sewage systems, and other engineering projects and structures.

Crops

Controlling erosion, conserving soil moisture, and maintaining tilth and the level of fertility are the main objectives of good management. The type and intensity of management needed depends on the kind of soil and the farm enterprise.

A cropping system is needed that maintains or improves the physical condition of the soil; protects the soil during heavy rains, flooding or drought, and other critical periods; aids in the control of weeds, insects, and plant disease; and provides an adequate economic return. A good cropping system is a sequence or rotation in which soil-improving crops balance soil-depleting crops. Grain sorghum and small grain, which leave large amounts of residue, are soil-improving crops. Cotton, for example, is a soil-depleting crop.

Soils in De Witt County respond to fertilization. The use of commercial fertilizer should be based on crop needs determined by soil tests. The amount and type of fertilizer needed depends on the nature of the soil, the crop to be grown, the production desired, the previous land use or cropping sequence, and the amount of available moisture.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, all kinds of soils are grouped

at three levels; the capability class, the subclass, and the unit. These levels are defined in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use. (None in De Witt County.)
Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife.
Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife. (None in De Witt County.)
Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply or to esthetic purposes. (None in De Witt County.)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–3 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

On the following pages the capability units in De Witt County are described and use and management of the soils is suggested.

CAPABILITY UNIT IIe–1

These soils are deep, gently sloping, well drained to moderately well drained, and very slowly permeable. The surface layer is clay, and the lower layers are clay.

Grain sorghum, cotton, and corn are the main crops. Controlling water erosion and maintaining soil tilth are the main concerns of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIe–2

The one soil in this unit, Papalote fine sandy loam, 1 to 3 percent slopes, is deep, gently sloping, moderately well drained, and slowly permeable. The surface layer is underlain by sandy clay.

Grain sorghum is the main crop. Controlling water erosion is the main concern of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIe–3

These soils are deep, gently sloping, well drained, and moderately permeable. The surface layer is fine sandy loam to sandy clay loam. The lower layers are sandy clay loam.

Grain sorghum, cotton, and corn are the main crops. Controlling water erosion is the main concern of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIe–4

The one soil in this unit, Cuero sandy clay loam, 0 to 2 percent slopes, is deep, nearly level to gently sloping, well drained, and moderately permeable. The surface layer is underlain by sandy clay loam.

Grain sorghum, corn, and cotton are the main crops. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management. It also helps to control erosion.

CAPABILITY UNIT IIw–1

The one soil in this unit, Trinity clay, occasionally flooded, is deep, somewhat poorly drained, and very slowly permeable. The surface layer is underlain by clay.

Grain sorghum and corn are the main crops. Flooding and wetness reduce yields in some years. Surface drainage is needed. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIw–2

These soils are deep, nearly level, well drained, and moderately permeable. The surface layer is loam, clay loam, or silty clay loam. The lower layers are silty clay loam, loam, or sandy clay loam.

Grain sorghum and corn are the main crops. Flooding damages crops and reduces yields in some years. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIw–3

These soils are deep, nearly level, moderately well drained, and very slowly permeable. The surface layer and lower layers are clay.

Grain sorghum and corn are the main crops. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management. Excess water is a concern in some seasons and surface drainage is needed.

CAPABILITY UNIT IIs–1

The one soil in this unit, Monteola clay, 0 to 1 percent slopes, is deep, moderately well drained, and very slowly permeable. The surface layer is underlain by clay.

Grain sorghum, corn, and cotton are the main crops. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIs–2

The one soil in this unit, Papalote fine sandy loam, 0 to 1 percent slopes, is deep, moderately well drained, and slowly permeable. The surface layer is underlain by sandy clay.

Grain sorghum is the main crop. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIc–1

These soils are deep, nearly level, well drained, and moderately permeable. The surface layer is fine sandy loam. The lower layers are sandy clay loam.

Grain sorghum, corn, and cotton are the main crops. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIIe–1

These soils are deep, gently sloping, moderately well drained to somewhat poorly drained, and slowly to very slowly permeable. The surface layer is fine sandy loam to loamy fine sand. The lower layers are clay to sandy clay.

Grain sorghum and corn are the main crops. Controlling erosion and maintaining soil tilth are the main concerns of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface maintains tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIe–2

These soils are deep, gently sloping, well drained to moderately well drained, and very slowly permeable. The surface layer and lower layers are clay.

Grain sorghum is the main crop. Controlling erosion, conserving moisture, and maintaining soil tilth are the main concerns of management. Terracing and contour farming help to control erosion and conserve moisture. Managing crop residue on the surface improves tilth and also helps in conserving moisture.

CAPABILITY UNIT IIIe–3

The one soil in this unit, Leemont clay, 3 to 5 percent slopes, is deep, moderately well drained, and very slowly permeable. The surface layer is underlain by clay.

Grain sorghum and corn are the main crops. Controlling erosion is the main concern of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIe–4

The only soils in this unit are those in the Denhawken-Elmendorf complex, 0 to 3 percent slopes. These soils are deep, well drained, and very slowly permeable.

Grain sorghum, corn, and cotton are the main crops. Controlling water erosion and maintaining soil tilth are the main concerns of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIe–5

The only soils in this unit are those in the Nueces-Sarita complex, 0 to 5 percent slopes. These soils are deep, well drained to moderately well drained, and moderately rapidly to moderately slowly permeable. The surface layer is fine sand, and the lower layers are sandy clay loam.

Watermelons are the main crop. Managing crop residue on the surface and otherwise controlling soil blowing is the main concern of management.

CAPABILITY UNIT IIIe–6

The one soil in this unit, Tremona loamy fine sand, 0 to 5 percent slopes, is deep, nearly level to gently sloping, somewhat poorly drained, and very slowly permeable. The surface layer is underlain by sandy clay.

This soil is used mainly for forage crops, such as bermudagrass. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling soil blowing and water erosion are the chief needs of management.

CAPABILITY UNIT IIIe–7

The one soil in this unit, Weesatche sandy clay loam, 3 to 5 percent slopes, is deep, well drained, and moderately permeable. The surface layer is underlain by sandy clay loam.

Grain sorghum is the main crop. Controlling water erosion is the main concern of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIe–8

These soils are deep, gently sloping, well drained, and moderately permeable. The surface layer is fine sandy loam, and the lower layers are sandy clay loam.

Grain sorghum is the main crop. Controlling water erosion is the main concern of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIe–9

These soils are deep, moderately well drained, and slowly to moderately slowly permeable. The surface layer is loamy fine sand to fine sand. The lower layers are sandy clay loam to sandy clay.

These soils are used mostly for forage crops, such as bermudagrass. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling soil blowing are the chief needs of management.

CAPABILITY UNIT IIIe–10

The one soil in this unit, Wilson clay loam, 1 to 3 percent slopes, is deep, gently sloping, somewhat poorly drained, and very slowly permeable. The surface layer is underlain by clay.

Grain sorghum, corn, and cotton are the main crops. Controlling erosion and maintaining soil tilth are the main concerns of management. Terracing and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIw–1

These soils are deep, nearly level to gently sloping, poorly drained to somewhat poorly drained, and very slowly permeable. The surface layer is fine sandy loam, and the lower layers are clay to sandy clay loam.

These soils are used mostly for pasture and forage crops. Growing bermudagrass and other pasture crops that provide a continuous cover, managing crop residue on the surface, and otherwise keeping the soil in good tilth are the chief management needs. Excess surface water is a concern in places, and surface drainage is needed.

CAPABILITY UNIT IIIw–2

The one soil in this unit, Fordtran loamy fine sand, 0 to 1 percent slopes, is deep, nearly level, somewhat poorly drained, and very slowly permeable. The surface layer is underlain by sandy clay.

These soils are used mostly for pasture or forage crops. Growing bermudagrass and other pasture crops that provide continuous cover, managing crop residue on the surface, and otherwise keeping the soil in good tilth are the chief management needs. Excess water in the surface layer is a concern in places, and surface drainage is needed.

CAPABILITY UNIT IIIw–3

The one soil in this unit, Wilson clay loam, 0 to 1 percent slopes, is deep, nearly level, somewhat poorly drained, and very slowly permeable. The surface layer is underlain by clay.

Grain sorghum, corn, and cotton are the main crops. Excess water is a concern in some seasons, and surface drainage is needed. Maintaining soil tilth is the main concern of management. Managing crop residue on the surface helps to maintain soil tilth and also helps in controlling erosion.

CAPABILITY UNIT IIIs–1

The one soil in this unit, Straber loamy fine sand, 0 to 1 percent slopes, is deep, nearly level, moderately well drained, and slowly permeable. It is used mostly for pasture and forage crops. Managing crop residue on the surface and otherwise keeping the soil in good tilth is the main concern of management.

CAPABILITY UNIT IIIs–2

The one soil in this unit, Crockett fine sandy loam, 0 to 1 percent slopes, is deep, nearly level, moderately well drained, and very slowly permeable. The surface layer is underlain by clay.

This soil is used mostly for pasture and forage crops. Growing bermudagrass and other pasture crops that provide continuous cover, managing crop residue on the surface, and otherwise keeping the soil in good tilth are the chief management needs.

CAPABILITY UNIT IVe–1

The one soil in this unit, Crockett fine sandy loam, 3 to 5 percent slopes, is deep, gently sloping, moderately well drained, and very slowly permeable. The surface layer is underlain by clay.

These soils are used mostly for pasture and forage crops. The main concern of management is water erosion. Growing perennial grass pastures, terracing, and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IVe–2

These soils are deep, gently sloping to sloping, well drained to moderately well drained, and very slowly permeable. The surface layer and lower layers are clay.

These soils are used mostly for pasture and forage crops, such as bermudagrass. Controlling water erosion is the main concern of management. Growing perennial grass pastures, terracing, and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IVe–3

These soils are deep, gently sloping, well drained, and very slowly permeable. The surface layer is fine sandy loam, and the lower layers are clay.

These soils are used mostly for pasture and forage crops, such as bermudagrass. Controlling water erosion is the main concern of management. Growing perennial grass pastures, terracing, and contour farming help to control water erosion. Managing crop residue on the surface improves tilth and also helps in controlling erosion.

CAPABILITY UNIT IVe–4

The one soil in this unit, Shiner fine sandy loam, 1 to 5 percent slopes, is shallow, gently sloping, well drained, and moderately permeable. The surface layer is underlain by gravelly fine sandy loam.

This soil is used mostly for pasture and forage crops, such as bermudagrass. Growing bermudagrass and

other pasture crops that provide continuous cover and otherwise controlling water erosion is the main concern of management.

CAPABILITY UNIT IVe–5

The only soils in this unit, Crockett soils, 2 to 5 percent slopes, eroded, are deep, gently sloping, moderately well drained, and very slowly permeable. The surface layer is fine sandy loam, and the lower layers are clay.

These soils are used mostly for pasture and forage crops, such as bermudagrass. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling erosion is the main concern of management.

CAPABILITY UNIT IVe–6

The only soils in this unit, Sarnosa soils, 3 to 5 percent slopes, eroded, are deep, gently sloping, well drained, and moderately permeable. The surface layer is fine sandy loam, and the lower layers are sandy clay loam.

These soils are used mostly for pasture or forage crops. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling water erosion is the chief concern of management.

CAPABILITY UNIT IVe–7

The one soil in this unit, Sarnosa fine sandy loam, 5 to 8 percent slopes, is deep, sloping, well drained, and moderately permeable. The surface layer is underlain by sandy clay loam.

This soil is used mostly for pasture and forage crops. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling water erosion is the main concern of management.

CAPABILITY UNIT IVw–1

The one soil in this unit, Zalla fine sand, occasionally flooded, is deep, nearly level, somewhat excessively drained, and rapidly permeable. The surface layer is underlain by loamy sand to sand.

These soils are used for range. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling soil blowing is the chief concern of management. Controlling flooding is also a main concern.

CAPABILITY UNIT IVs–1

The one soil in this unit, Valco sandy clay loam, 1 to 8 percent slopes, is shallow, gently sloping to sloping, well drained, and moderately permeable.

These soils are used mostly for range. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling water erosion is the chief concern of management.

CAPABILITY UNIT IVs–2

These soils are deep, nearly level to gently sloping, somewhat poorly drained, and very slowly permeable. The surface layer is gravelly loamy sand to loamy fine sand. The lower layers are clay to gravelly clay.

These soils are used mostly for range and pasture. Growing bermudagrass and other pasture crops that provide continuous cover and otherwise controlling soil blowing and water erosion are the chief management needs.

CAPABILITY UNIT Vw–1

These soils are deep, nearly level, well drained to somewhat poorly drained, and moderately to very slowly permeable. The surface layer is clay loam or silty clay loam to clay. The lower layers are sandy clay loam or silty clay loam to clay.

These soils are used mostly for range. They are not suited to crops. Controlling flooding is the main concern of management.

CAPABILITY UNIT VIe–1

The one soil in this unit, Shiner fine sandy loam, 5 to 8 percent slopes, is shallow, sloping, well drained, and moderately permeable. The surface layer is underlain by gravelly fine sandy loam. This soil is used for range. It is not suited to crops.

CAPABILITY UNIT VIs–1

Only Natraqualfs are in this unit. They are deep, nearly level, somewhat poorly drained, and moderately slowly permeable. They are used mostly for range. They are not suited to crops.

CAPABILITY UNIT VIs–2

These soils are deep, gently sloping to sloping, well drained to moderately well drained, and moderately to moderately slowly permeable. The surface layer is gravelly to very gravelly loamy sand to gravelly sandy clay loam. The lower layers are gravelly to very gravelly sandy clay loam to very gravelly loamy sand.

These soils are used mostly for range. They are not suited to crops.

Pasture and Hay

Most farms in De Witt County are acreages of crops and pasture and smaller acreages of improved pasture. Improved pasture is also maintained within areas of range. The well managed acreages in pasture and hay provide a balanced forage program.

Essentially in pasture and hay management, the vegetation is grazed and cut at an intensity that maintains an adequate protective plant cover and an adequate leaf surface.

Other management, such as fertilization, weed control, and rotation grazing, are important in maintaining and improving the plant cover. Fertilizer should be applied according to the results of soil tests and in quantities adequate for plant needs and desired forage production. Weed control is much less of a concern on well managed, properly used pasture than on improperly managed, overused pasture. An excellent ground cover of grass prevents the invasion of undesirable plants and tends to shade and crowd out the undesirable plants that do germinate. Late weed control can be detrimental to improved pasture plants.

A well managed pasture is dominantly one species of perennial grass. It is adequately fenced and cross fenced to insure proper rotation. The fertility level is adequate and the plant cover is free of weeds. Because forage production fluctuates during the growing season, the stocking rate should be adjusted accordingly in

order to maintain continued growth and proper height of the dominant grass.

Pasture and hay groups

The soils of De Witt County have been assigned to 15 pasture and hay groups according to their suitability for the production of forage. The soils in each group are enough alike to be suited to the same grasses, to have similar limitations and hazards, to require similar management, and to have similar productivity and other responses to management. Thus, the pasture and hay group is a convenient grouping of soils to collectively indicate their management needs. The pasture and hay groups are identified by numerals and uppercase letters; for example, 1A.

The numbers are assigned locally, but they are part of a statewide system. The numbers are not consecutive because not all of the groups in the system are represented by the soils in De Witt County.

The names of the soils in any group can be found by referring to the "Guide to Mapping Units" at the back of the report.

PASTURE AND HAY GROUP 1A

In this group are deep, clayey, nearly level soils on flood plains along local streams. They are subject to overflow unless protected. They crack and take in water rapidly when dry, but expand when wet and are very slowly permeable. They become puddled if grazed when wet. The available water capacity is high.

Seedbed preparation is difficult. Nitrogen and phosphorus are needed for optimum forage production. The production potential is high for such species as improved bermudagrass, kleingrass-75, medio bluestem, and johnsongrass.

PASTURE AND HAY GROUP 1C

This group is made up of loamy, nearly level soils on bottom land. These soils are subject to overflow unless protected. If they are grazed when wet, tilth deteriorates in the surface layer. Permeability is moderate. The available water capacity is high.

Seedbed preparation is not difficult. Nitrogen and phosphorus are needed for sustained forage production. The production potential is high for such species as improved bermudagrass, kleingrass-75, and johnsongrass.

PASTURE AND HAY GROUP 2A

The one soil in this group, Sinton loam, is a deep, nearly level soil on bottom land. In some areas it is subject to overflow unless protected. Permeability is moderate. The available water capacity is medium.

This soil is productive, but nitrogen and phosphorus are needed for optimum forage production. Light summer rains provide a quick response in forage production. Suitable species are improved bermudagrass, kleingrass-75, and johnsongrass.

PASTURE AND HAY GROUP 3A

The one soil in this group, Zalla fine sand, occasionally flooded, is a deep, nearly level, sandy soil on bottom land. In some areas it is subject to overflow unless protected. Permeability is rapid. The available water capacity is low.

This soil is best suited to summer forage production. A complete fertilizer of nitrogen, phosphorus, and potash is needed. Applications should be split and applied at planned intervals throughout the growing season. Suitable grasses are improved bermudagrass and lovegrass.

PASTURE AND HAY GROUP 7A

In this group are deep, nearly level to gently sloping loamy to clayey soils on uplands. They crack and take in water rapidly when dry, but expand when wet and are slowly to very slowly permeable. The available water capacity is medium and high.

This group is suited to summer and winter forage production. Seedbed preparation is difficult. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass, kleingrass-75, medio bluestem, and johnsongrass.

PASTURE AND HAY GROUP 7B

The one soil in this group, Leemont clay, 5 to 8 percent slopes, is a deep, sloping clayey soil on uplands. Permeability is very slow. The available water capacity is high.

This soil is best suited to summer forage production. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass and medio bluestem.

PASTURE AND HAY GROUP 7C

In this group are deep, nearly level to sloping loamy soils in upland areas. Permeability is moderate. The available water capacity is high.

This group is suited to summer and winter forage production. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass, kleingrass-75, and johnsongrass.

PASTURE AND HAY GROUP 7H

In this group are deep, gently sloping loamy to clayey soils. They have a crusty surface when dry and are very slowly permeable. The available water capacity is medium to high.

This group is best suited to summer forage production. Seedbed preparation is difficult. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass, kleingrass-75, and medio bluestem.

PASTURE AND HAY GROUP 8A

In this group are deep, nearly level to gently sloping loamy soils on uplands. Permeability is very slow to slow. The available water capacity is medium to high.

This group is best suited to summer forage production. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass, medio bluestem, and kleingrass-75.

PASTURE AND HAY GROUP 8C

In this group are deep, nearly level to sloping, loamy to gravelly loamy soils on uplands. Permeability is moderate. The available water capacity is medium to high.

This group is suited to summer and winter forage production. Nitrogen and phosphorus are needed for

sustained forage production. Suitable grasses are improved bermudagrass and gordo bluestem.

PASTURE AND HAY GROUP 9A

In this group are deep, nearly level to gently sloping sandy to gravelly sandy soils on uplands. Permeability is very slow to moderately rapid. The available water capacity is low to high.

This group is best suited to summer forage production. Nitrogen, phosphorus, and potassium are needed for sustained forage production and should be applied in split applications during the growing season. Suitable grasses are improved bermudagrass and weeping lovegrass.

PASTURE AND HAY GROUP 9B

The one soil in this group, Catilla fine sand, 0 to 5 percent slopes, is a deep, nearly level to gently sloping sandy soil on uplands. Permeability is moderately slow. The available water capacity is low.

This group is best suited to summer forage production. Nitrogen, phosphorus, and potassium are needed and should be applied in split applications during the growing season. Well suited grasses are weeping lovegrass and Coastal bermudagrass.

PASTURE AND HAY GROUP 13A

The one soil in this group, Valco sandy clay loam, 1 to 8 percent slopes, is a shallow, gently sloping to sloping loamy soil on uplands. Permeability is moderate. The available water capacity is very low.

This group is best suited to summer forage production. Nitrogen and phosphorus are needed for sustained forage production. Suitable grasses are improved bermudagrass, KR bluestem, and Kleberg bluestem.

PASTURE AND HAY GROUP 14A

In this group are shallow, gently sloping to sloping loamy soils on uplands. Permeability is moderate. The available water capacity is very low.

This group is best suited to summer forage production. Seedbed preparation is difficult on the steeper slopes. Nitrogen and phosphorus are needed for sustained forage production. The best suited grasses are KR bluestem and Coastal bermudagrass.

Predicted Yields

Table 2 lists predicted yields of the principal crops grown in the county. The predictions are based on estimates made by farmers, soil scientists, and others who have knowledge of yields in the county and on information taken from research data. The predicted yields are average yields per acre that can be expected by commercial farmers at the level of management that tends to produce the highest economic returns.

The yields are given for dryland soils. Soils used only as range or for recreation are not listed in this table.

Crops other than those shown in table 2 are grown in the county, but the acreage is small or reliable data on yields are not available.

The yields listed in table 2 can be expected if–

1. Rainfall is effectively used and conserved.
2. Surface or subsurface drainage systems are installed.
3. Crop residue is managed to maintain soil tilth.
4. Minimum but timely tillage is used.
5. Insects, diseases, and weeds are controlled.
6. Fertilizer is applied according to the results of soil tests and crop needs.
7. Adapted crop varieties are seeded at recommended seeding rates.

Range[2]

About 90 percent of the acreage in De Witt County is in native vegetation and is used as range. There are many large ranches and a few small ones. Some livestock farms use small areas of native vegetation as a source of forage, and the livestock receive supplemental forage from feed grown on cropland and from grazing tame pasture. The livestock is almost exclusively cattle, predominantly cow-calf enterprises. A few horses are raised for ranch work. In favorable years a few stocker-type animals are raised.

On the larger ranches, another important use of range is to provide food and cover for deer and for quail, waterfowl, and other birds.

The original plant cover in De Witt County was mainly grasses and the trees along drainageways. The southeastern part was a savannah of grasses, oak, and forbs. Continuous heavy grazing for many years has resulted in the deterioration of the climax plant community and a lower total forage production. Many of the better forage plants have declined and have been replaced by less palatable grasses, weeds, and brush.

Forage production is highest in April, May, and June. During this period in most years, rainfall is adequate and the temperature is most favorable. Another growth period occurs in fall, generally during September and October and early in November. Rainfall is usually adequate during this period, but production is limited as a result of cooler temperatures and shorter days.

Range sites and condition classes

Different kinds of soil differ in their capacity to produce grass and other plants for grazing. Soils that produce about the same kinds and amounts of forage under similar range conditions make up a range site.

Range sites are kinds of range that differ in their potential to produce vegetation. The soils of any one range site produce about the same kind of climax vegetation, which is the stabilized plant community. Climax vegetation reproduces itself and does not change so long as the environment remains unchanged. Throughout the prairie and the plains, the climax vegetation consists of plants that were growing there when the region was first settled. The most productive combination of forage plants on a range site is generally the climax vegetation.

Decreasers are plants in the climax vegetation that tend to decrease in relative amount under close grazing. They generally are the tallest and most produc-

[2] STANLEY T. REINKE, range conservationist, Soil Conservation Service.

TABLE 2.—*Predicted average yields per acre of principal crops*

[A dash in the column indicates that the crop is not suited or is not commonly grown on the soil]

Soil	Grain sorghum	Corn	Cotton (lint)	Improved pasture
	Lbs	*Bu*	*Lbs*	*AUM*[1]
Branyon clay, 0 to 1 percent slopes	4,750		450	7.0
Buchel clay, occasionally flooded	4,250	50	450	7.5
Catilla fine sand, 0 to 5 percent slopes				4.5
Crockett fine sandy loam, 0 to 1 percent slopes	3,200	45	400	6.0
Crockett fine sandy loam, 1 to 3 percent slopes	3,000	40	350	6.0
Crockett fine sandy loam, 3 to 5 percent slopes	2,500	30	200	5.5
Crockett soils, 2 to 5 percent slopes, eroded	2,500	30	200	5.0
Cuero sandy clay loam, 0 to 2 percent slopes	3,000	50	400	7.0
Degola clay loam, occasionally flooded	4,000	50	450	7.0
Degola soils, frequently flooded				7.0
Denhawken-Elmendorf complex, 0 to 3 percent slopes	3,500	35	325	6.0
Edna fine sandy loam, 0 to 1 percent slopes	3,800	40	375	8.0
Ferris soils, 3 to 5 percent slopes, eroded	2,000		250	4.0
Fordtran loamy fine sand, 0 to 1 percent slopes	2,000		250	5.5
Garcitas gravelly loamy fine sand, 0 to 3 percent slopes				4.5
Heiden clay, 1 to 3 percent slopes	4,500	60	400	8.0
Heiden clay, 3 to 5 percent slopes	3,000	50	350	6.0
Houston Black clay, 0 to 1 percent slopes	5,000	60	500	8.0
Houston Black clay, 1 to 3 percent slopes	4,800	55	450	8.0
Leemont clay, 3 to 5 percent slopes	2,800	35	300	6.0
Leemont clay, 5 to 8 percent slopes	2,250			5.0
Leming loamy fine sand, 0 to 5 percent slopes	3,000		300	4.5
Lupe gravelly sandy clay loam, 1 to 8 percent slopes				4.5
Mabank fine sandy loam, 0 to 1 percent slopes	3,000	40	350	6.0
Mabank fine sandy loam, 1 to 3 percent slopes	2,500	35	300	6.0
Meguin silty clay loam, occasionally flooded	4,500	50	400	6.5
Meguin soils, frequently flooded				6.5
Miguel fine sandy loam, 3 to 5 percent slopes				4.5
Miguel fine sandy loam, 3 to 5 percent slopes, eroded				4.5
Monteola clay, 0 to 1 percent slopes	3,000	45	400	7.0
Monteola clay, 1 to 3 percent slopes	2,800	40	350	7.0
Nueces-Sarita complex, 0 to 5 percent slopes				4.0
Orelia fine sandy loam, 0 to 2 percent slopes	2,500			8.0
Papalote fine sandy loam, 0 to 1 percent slopes	2,500		250	5.5
Papalote fine sandy loam, 1 to 3 percent slopes	2,250		200	5.0
Runge fine sandy loam, 0 to 1 percent slopes	3,000	45	250	6.5
Runge fine sandy loam, 1 to 3 percent slopes	2,750	35	250	6.0
Runge fine sandy loam, 3 to 5 percent slopes	2,250	30	200	5.5
Sarnosa fine sandy loam, 0 to 1 percent slopes	3,000	45	300	6.5
Sarnosa fine sandy loam, 1 to 3 percent slopes	2,750	40	300	6.5
Sarnosa fine sandy loam, 3 to 5 percent slopes	2,750	35	250	6.0
Sarnosa fine sandy loam, 5 to 8 percent slopes				5.5
Sarnosa soils, 3 to 5 percent slopes, eroded			200	5.5
Shiner fine sandy loam, 1 to 5 percent slopes				2.5
Sinton loam	4,000	50	350	6.5
Straber loamy fine sand, 0 to 1 percent slopes	2,500	40		6.0
Straber loamy fine sand, 1 to 5 percent slopes	2,250	40		6.0
Tremona loamy fine sand, 0 to 5 percent slopes	2,500			5.5
Tremona gravelly loamy sand, 1 to 5 percent slopes	2,000			5.0
Trinity clay, occasionally flooded	3,500	60	450	8.0
Trinity clay, frequently flooded				8.0
Valco sandy clay loam, 1 to 8 percent slopes	1,250			2.0
Weesatche sandy clay loam, 1 to 3 percent slopes	3,250	35	350	6.0
Weesatche sandy clay loam, 3 to 5 percent slopes	2,750			5.5
Wilson clay loam, 0 to 1 percent slopes	3,000	45	350	5.5
Wilson clay loam, 1 to 3 percent slopes	2,500	35	300	5.5
Zalla fine sand, occasionally flooded	1,100			4.0

[1] Animal-unit-month is the number of months that 1 acre will provide grazing for 1 animal, or 1,000 pounds of live weight, or it is the number of months times the number of animal units.

tive perennial grasses and forbs and the most palatable to livestock.

Increasers are plants in the climax vegetation that increase in relative amount as the more desirable decreaser plants are reduced by close grazing. They are commonly shorter than decreasers and are generally less palatable to livestock.

Invaders are plants that cannot compete with plants in the climax plant community for moisture, nutrients, and light. Hence, they invade the site and grow along with increasers after the climax vegetation has been reduced by grazing. Many are annual weeds, and some are shrubs that have some grazing value. Others have little value for grazing.

Range condition is judged according to standards that apply to the particular range site. It expresses the present kind and amount of vegetation as related to the climax plant community for that site. Four range condition classes indicate the degree of departure from the potential, or climax, vegetation brought about by grazing or other uses.

A range is in excellent condition if 76 to 100 percent of the vegetation is the same as in the climax stand. It is in good condition if the percentage is 51 to 75; in fair condition if the percentage is 26 to 50; and in poor condition if the percentage is less than 25.

Potential forage production depends on the range site. Current forage production depends on the range condition and the moisture available to plants during their growing season.

A primary objective of good range management is to keep range in excellent or good condition to conserve water, improve yields, and protect the soils. Important changes in the kind of cover on a range site take place gradually and can be misinterpreted or overlooked. Growth encouraged by heavy rainfall, for example, makes the range appear to be in good condition, when actually the cover is weedy and the long-term trend is toward lower production. On the other hand, some range that has been closely grazed for short periods under the supervision of a careful manager, may have a degraded appearance that temporarily conceals its quality and ability to recover.

Descriptions of range sites

On the following pages the range sites of De Witt County are described and the potential annual yield of air-dry herbage is estimated for each site in excellent condition. The soils in each site can be determined by referring to the "Guide to Mapping Units" at the back of this soil survey.

BLACKLAND RANGE SITE

The soils of this site are deep, nearly level to sloping clays and clay loams. They are very slowly permeable and have mainly a high available water capacity.

The climax plant community is a true-prairie type of tall and mid grasses and associated forbs. The potential plant community is 60 percent little bluestem; 15 percent indiangrass; 10 percent big bluestem, eastern gama, and switchgrass; 10 percent brownseed paspalum, sedges, Texas wintergrass, knotroot bristlegrass, and Scribner panicum, and 5 percent annual forbs.

If this site is in excellent condition, it produces approximately 6,000 pounds of air-dry herbage per acre in favorable years and 3,200 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, indiangrass, big bluestem, eastern gama, and switchgrass decrease. Such plants as brownseed paspalum, Texas wintergrass, and knotroot bristlegrass increase. If overgrazing is prolonged, annual and total production are greatly reduced and ragweed, broomweed, mesquite, Texas grama, and annuals invade the site.

CHALKY RIDGE RANGE SITE

The soils of this site are shallow, gently sloping to sloping fine sandy loams underlain by weakly cemented sandstone. They are moderately permeable and have a very low available water capacity.

The climax plant community is true prairie and scattered large live oak. The potential plant community is 55 percent little bluestem; 15 percent indiangrass; 10 percent side-oats grama, silver bluestem, and dropseeds; 5 percent slim tridens, Texas wintergrass, three-awn, low panicums, buffalograss, and fall witchgrass; 5 percent live oak, coralberry, bumelia, and spiny hackberry; and 10 percent such forbs as gayfeather, penstemon, halfshrub sundrop, bundleflower, sensitivebrier, yellow neptunia, and annual forbs.

If this site is in excellent condition, it produces approximately 3,000 pounds of air-dry herbage per acre in favorable years and 1,250 pounds per acre in unfavorable years. Approximately 90 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, indiangrass, side-oats grama, and silver bluestem decrease. Such plants as slim tridens, Texas wintergrass, and three-awn increase. If overgrazing is prolonged, annuals, woody plants, and bare soil dominate the site and annual and total production are greatly reduced.

CLAY LOAM RANGE SITE

The soils of this site are deep, nearly level to gently sloping sandy clay loams. They are moderately permeable and have a high available water capacity.

The climax or potential plant community is an open grassland and scattered trees or woody shrubs, dominantly mid grasses and associated forbs. The climax plant community is 35 percent little bluestem; 5 percent indiangrass; 10 percent silver bluestem; 10 percent plains and southwestern bristlegrass; 15 percent buffalograss and curly mesquite; 15 percent other grasses; 5 percent woody plants, such as Texas colubrina, wolfberry, and vine-ephedra; and 5 percent bundleflower, sensitivebrier, and orange zexmenia.

If this site is in excellent condition, it produces approximately 5,800 pounds of air-dry herbage per acre in favorable years and 3,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, indiangrass, silver bluestem, and bristlegrass decrease. Such plants as three-awn and curly mesquite increase. If overgrazing is prolonged, annual and total production are greatly reduced and mesquite, whitebrush, and other mixed brush dominate the site.

CLAYEY BOTTOMLAND RANGE SITE

The soils of this site are deep, nearly level clays. They are very slowly permeable and have a high available water capacity. They are subject to overflow.

The climax plant community is a mixture of tall and mid grasses and hardwoods. The potential plant community is 15 percent trees, such as oak, elm, and pecan; 20 percent indiangrass, switchgrass, and rustyseed paspalum; 15 percent little bluestem; 30 percent Virginia wildrye, southwestern bristlegrass, and vine-mesquite; 5 percent sedges; 5 percent perennial forbs; and 10 percent annual forbs and weeds. Spiny aster and some cordgrass are on low wet and slightly saline soils.

If this site is in excellent condition, it produces approximately 7,000 pounds of air-dry herbage per acre in favorable years and 5,000 pounds per acre in unfavorable years. Approximately 80 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, indiangrass, rustyseed paspalum, switchgrass, and little bluestem decrease. Such plants as bristlegrass and paspalums increase. If overgrazing is prolonged, annual weeds, common bermudagrass, and woody vegetation make up a substantial part of the annual production, and total production is greatly reduced.

CLAYPAN PRAIRIE (BL) RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sandy loams to clay loams. They are very slowly permeable and have a medium to high available water capacity.

The climax plant community is a true prairie and scattered trees along watercourses. The climax plant community is 55 percent little bluestem; 15 percent indiangrass; 10 percent switchgrass, big bluestem, wildrye, side-oats grama, and silver bluestem; 5 percent other grasses; 5 percent oak, elm, and hackberry; and 10 percent such forbs as scurfpea, halfshrub sundrop, penstemon, gayfeather, sensitivebrier, yellow neptunia, and annual forbs.

If this site is in excellent condition, it produces approximately 5,000 pounds of air-dry herbage per acre in favorable years and 3,000 pounds per acre in unfavorable years. Approximately 90 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little and big bluestem, indiangrass, switchgrass, and wildrye decrease, and silver bluestem, side-oats grama, Texas wintergrass, and dropseeds increase. Low quality grasses, such as three-awn and brush, dominate the community. Annual and total production are greatly reduced.

CLAYPAN PRAIRIE (CO) RANGE SITE

The soils of this site are deep, nearly level fine sandy loams. They are very slowly permeable and have a high available water capacity.

The potential plant community is an open grassland, dominated by mid grasses. The potential plant community is 30 percent little bluestem; 15 percent switchgrass; 5 percent indiangrass; 35 percent vine-mesquite, silver bluestem, and longtom paspalum; 10 percent buffalo and curly mesquite, and 5 percent such forbs as bundleflower, sensitivebrier, and yellow neptunia.

If this site is in excellent condition, it produces approximately 7,000 pounds of air-dry herbage per acre in favorable years and 5,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, switchgrass, and vine-mesquite decrease. Such plants as knotroot bristlegrass, windmillgrass, huisache, and mesquite increase and invade. If overgrazing is prolonged, annual and total production are greatly reduced.

CLAYPAN PRAIRIE (RG) RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sandy loams. They are very slowly permeable and have a medium available water capacity.

The potential plant community is an open grassland, dominated by mid grasses. The potential plant community is 25 percent little bluestem and four-flower trichloris; 35 percent Arizona cottontop, side-oats grama, vine-mesquite, and silver bluestem; 10 percent plains bristlegrass; 15 percent buffalograss and curly mesquite; 10 percent other grasses; a trace of woody plants; and 5 percent such forbs as bundleflower, sensitivebrier, yellow neptunia, western indigo, bush sunflower, guara, ruellia, and annual forbs.

If this site is in excellent condition, it produces approximately 5,000 pounds of air-dry herbage per acre in favorable years and 2,500 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, trichloris, little bluestem, Arizona cottontop, side-oats grama, and vine-mesquite decrease. Plains bristlegrass, buffalograss, and silver bluestem increase. If overgrazing is prolonged, low quality grasses, such as three-awn, fall witchgrass, and brush, dominate the site.

DEEP SAND RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sands. They are moderately rapidly to moderately slowly permeable and have a low available water capacity.

The climax plant community is an open grassland and scattered mesquite and live oak. The potential plant community is 40 percent seacoast bluestem; 10 percent crinkle-awn and switchgrass; 10 percent brownseed paspalum and tanglehead; 10 percent knotroot panicum and hooded windmillgrass; 10 percent spike and plains bristlegrass; 5 percent three-awn and other grasses; 5 percent mesquite, live oak, lantana, and condalias; and 10 percent orange zexmenia, snoutbean, western indigo, sensitivebrier, croton, and other annual forbs.

If this site is in excellent condition, it produces approximately 4,500 pounds of air-dry herbage per acre in favorable years and 2,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, seacoast bluestem, crinkle-awn, and switchgrass decrease. Such plants as brownseed paspalum, knotroot panicum, and

three-awn increase. If overgrazing is prolonged, the soils become bare and soil blowing is a hazard.

DEEP SAND SAVANNAH RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sands. They have moderately slow permeability and low available water capacity.

The climax plant community is an open prairie and scattered motts of live oak or mesquite. The potential plant community is 50 percent seacoast bluestem; 20 percent big bluestem, crinkle-awn, and switchgrass; 10 percent brownseed paspalum; 5 percent other grasses; 5 percent live oak and mesquite; and 10 percent bundleflower, milkpea, American and least snoutbeans, and annual forbs.

If this site is in excellent condition, it produces approximately 4,500 pounds of air-dry herbage per acre in favorable years and 2,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, seacoast bluestem, big bluestem, crinkle-awn, and switchgrass decrease. Such plants as brownseed paspalum and gulfdune paspalum and trees increase. If overgrazing is prolonged, the site becomes bare and starts to blow and shifting dunes form. Revegetation is extremely difficult.

ERODED BLACKLAND RANGE SITE

The soils of this site are deep, gently sloping clays that have been damaged by erosion. They are very slowly permeable and have a high available water capacity.

The potential plant community is a tall grass prairie and scattered live oak, elm, or hackberry trees. The climax plant community is 50 percent little bluestem, 20 percent indiangrass and big bluestem; 15 percent wildrye, switchgrass, Florida paspalum, side-oats grama, tall dropseed, silver bluestem, Texas wintergrass, and other grasses; 5 percent woody plants, such as live oak, hackberry, elm, and bumelia; and 10 percent Engelmann daisy, penstemon, gayfeather, bundleflower, sensitivebrier, prairie-clover, and other forbs.

If this site is in excellent condition, it produces approximately 6,000 pounds of air-dry herbage per acre in favorable years and 4,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, big and little bluestem and indiangrass decrease, and such plants as silver bluestem, side-oats grama, Texas wintergrass, and buffalograss become strong increasers. If overgrazing is prolonged, Texas wintergrass, buffalograss, hairy tridens, three-awn, ragweed, and broomweed dominate the site, thus greatly reducing annual and total production.

GRAVELLY RANGE SITE

The soils of this site are deep, gently sloping to sloping, gravelly to very gravelly loamy sands. They are moderately to very slowly permeable and have a low to very low available water capacity.

The climax plant community is a post oak, blackjack oak savannah. The potential plant community is 55 percent little bluestem; 15 percent indiangrass, switchgrass, beaked panicum, and purpletop; 10 percent brownseed paspalum, side-oats grama, purple lovegrass, and other grasses; 10 percent post oak and blackjack oak; 5 percent hawthorns, American beautyberry, and greenbrier; and 5 percent lespedezas, tickclover, bundleflower, snoutbean, and annual forbs.

If this site is in excellent condition, it produces 4,500 pounds of air-dry herbage per acre in favorable years and 2,200 pounds per acre in unfavorable years. Approximately 85 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, indiangrass, switchgrass, beaked panicum, and purpletop decrease. Such plants as fall witchgrass, low panicums, three-awn, and annual weeds invade and increase. If overgrazing is prolonged, annual and total production are greatly reduced. In some areas oak, yaupon, and other woody plants form a dense overstory.

GRAVELLY LOAM RANGE SITE

The soils of this site are deep, gently sloping to sloping gravelly sandy clay loams. They are moderately permeable and have a medium available water capacity.

The potential plant community is a tall and mid grass prairie and widely scattered trees or motts of oak, elm, or hackberry, The climax plant community is 50 percent little bluestem; 10 percent indiangrass; 20 percent side-oats grama, silver bluestem, tall dropseed, Texas wintergrass, Texas cupgrass, and vine-mesquite; 5 percent other grasses; 5 percent oak, hackberry, elm, and bumelia; and 10 percent such forbs as Engelmann daisy, penstemon, bundleflower, sensitivebrier, and other forbs.

If this site is in excellent condition, it produces approximately 4,000 pounds of air-dry herbage per acre in favorable years and 2,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem and indiangrass are the primary decreasers, and side-oats grama, silver bluestem, dropseeds, and Texas wintergrass are aggressive increasers. If overgrazing is prolonged, hairy grama, hairy tridens, Texas grama, tumblegrass, three-awn, and annual weeds and brush invade, thus greatly reducing annual and total production.

GRAY SANDY LOAM RANGE SITE

The soils of this site are deep, nearly level to sloping fine sandy loams. They are moderately permeable and have a medium available water capacity.

The climax plant community is an open grassland and scattered chaparral. The potential plant community is 20 percent little bluestem; 40 percent Arizona cottontop, pinhole bluestem, lovegrass tridens, plains lovegrass, and plains bristlegrass; 10 percent hooded windmillgrass; 10 percent pink pappusgrass; 10 percent other grasses; 5 percent kidneywood, range ratany, guajillo, and cenizo; and 5 percent forbs.

If this site is in excellent condition, it produces approximately 4,500 pounds of air-dry herbage per acre in favorable years and 2,500 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little

bluestem, Arizona cottontop, lovegrass tridens, and plains lovegrass decrease. Such plants as hooded windmillgrass, Texas bristlegrass, pink pappusgrass, and fall witchgrass increase. If overgrazing is prolonged, red grama, red lovegrass, Halls panicum, three-awn, mixed brush, and annuals become dominant, and total production is greatly reduced.

LOAMY BOTTOMLAND RANGE SITE

The soils of this site are deep, nearly level loams, clay loams, silty clay loams and fine sands. They are moderately to rapidly permeable and have a low to high available water capacity.

The climax plant community is a savannah of varying plants. The potential plant community is 20 percent trees, such as oak, pecan, hackberry, elm, ash, and woody vines; 20 percent sedges, Virginia wildrye, and rustyseed paspalum; 45 percent indiangrass and switchgrass; 10 percent uniolas, redtop panicum, longtom, and other grasses; and 5 percent such forbs as snoutbean, wildbean, and partridgepea.

If this site is in excellent condition, it produces approximately 7,000 pounds of air-dry herbage per acre in favorable years and 4,000 pounds per acre in unfavorable years. Approximately 80 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, wildrye, rustyseed paspalum, indiangrass, switchgrass, and uniolas decrease. Such plants as panicums and longtom paspalum increase. If overgrazing is prolonged, annual weeds and woody vegetation make up a substantial part of the annual production, and total production is greatly reduced.

LOAMY SAND RANGE SITE

The soils of this site are deep, nearly level to gently sloping loamy fine sands. They are slowly permeable and have a medium available water capacity.

The climax plant community is an open grassland and a few scattered mesquites and oaks. The potential plant community is 20 percent little bluestem; 20 percent crinkle-awn and brownseed paspalum; 20 percent indiangrass and switchgrass; 10 percent Arizona cottontop; 10 percent side-oats grama and pink pappusgrass; 10 percent hooded windmillgrass, knotroot panicum, and plains bristlegrass; and 10 percent such forbs as snoutbean, western indigo, and annual forbs.

If this site is in excellent condition, it produces approximately 4,500 pounds of air-dry herbage per acre in favorable years and 2,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, indiangrass, big bluestem, and crinkle-awn decrease. Such plants as brownseed paspalum and low panicums increase. If overgrazing is prolonged, red lovegrass, fringed signalgrass, white snakeroot, croton, pricklypear cactus, and three-awn invade.

SANDY RANGE SITE

The soils of this site consist of deep, nearly level to gently sloping loamy fine sands. They have slow to very slow permeability and low to medium available water capacity.

The climax plant community is an open savannah and a few blackjack and post oak trees or motts of live oaks. The climax plant community is 50 percent seacoast bluestem; 10 percent indiangrass and switchgrass; 10 percent big bluestem and crinkle-awn; 5 percent brownseed paspalum; 5 percent other grasses; 15 percent blackjack, post oak, and live oak; and 5 percent American snoutbean, western indigo, and annual forbs.

If this site is in excellent condition, it produces approximately 6,000 pounds of air-dry herbage per acre in favorable years and 2,500 per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, seacoast bluestem, indiangrass, switchgrass, big bluestem, and crinkle-awn decrease. Such plants as brownseed paspalum, low panicums, and panamerican balsamscale increase. If overgrazing is prolonged, red lovegrass, fringed signalgrass, white snakecotton, croton, and three-awn invade, and bare areas of dunes appear.

SANDY LOAM RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sandy loams. They are moderately permeable and have a high available water capacity.

The potential plant community is an open grassland dominated by mid grasses and some forbs and woody plants. The climax plant community is 40 percent little bluestem; 20 percent Arizona cottontop and silver bluestem; 20 percent plains and southwestern bristlegrass and hooded windmillgrass; 10 percent other grasses; 5 percent kidneywood, spiny hackberry, and wolfberry; and 5 percent bundleflower, sensitivebrier, western indigo, and other forbs.

If this site is in excellent condition, it produces approximately 5,400 pounds of air-dry herbage per acre in favorable years and 3,000 pounds per acre in unfavorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem and Arizona cottontop decrease. Such plants as silver bluestem, bristlegrass, and hooded windmillgrass increase. If overgrazing is prolonged, red lovegrass, red grama, blackbrush, and spiny hackberry become dominant, and total production is greatly reduced.

SANDY PRAIRIE RANGE SITE

The soils of this site are deep, nearly level to gently sloping loamy fine sands and gravelly loamy fine sands. They are very slowly permeable and have a low to high available water capacity.

This climax plant community is a true prairie. The potential plant community is 55 percent little bluestem; 20 percent indiangrass, crinkle-awn, and big bluestem; 10 percent Florida paspalum and switchgrass; 10 percent brownseed paspalum, longspike tridens, low panicums, fringeleaf paspalums, and other grasses; and 5 percent gayfeather, sensitivebrier, herbaceous mimosa, bundleflower, yellow neptunia, snoutbean, and annual and other forbs.

If this site is in excellent condition, it produces approximately 6,000 pounds of air-dry herbage per acre in favorable years and 3,500 pounds per acre in unfa-

vorable years. Approximately 95 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, big and little bluestem, indiangrass, crinkle-awn and switchgrass decrease, and brownseed paspalum, low panicums, and others increase. As retrogression continues, gulf muhly, panamerican balsamscale, smutgrass, and annuals dominate the site, thus greatly reducing total production.

SALTY RANGE SITE

The soils of this site are deep, nearly level fine sandy loams. They are moderately slowly permeable and have a low available water capacity.

The climax plant community is an open grassland of salt-tolerant grasses. The potential plant community is 75 percent gulf cordgrass; 10 percent switchgrass; 10 percent other grasses; and 5 percent bushy sea-oxeye, spiny aster, and buckwheat.

If this site is in excellent condition, it produces approximately 7,000 pounds of air-dry herbage per acre in favorable years and 3,500 pounds per acre in unfavorable years. Approximately 85 percent of this production furnishes forage for cattle.

Under continuous burning and heavy grazing by cattle, gulf cordgrass and switchgrass decrease. The plant community eventually becomes bushy sea-oxeye and spiny aster. Revegetation is extremely difficult because of high salinity.

SHALLOW RANGE SITE

The soils of this site are shallow, gently sloping to sloping sandy clay loams. They are moderately permeable and have a very low available water capacity.

The climax plant community is an open grassland and a few scattered woody plants and many forbs. The potential plant community is 30 percent silver and little bluestem, tanglehead, and Arizona cottontop; 25 percent fall witchgrass, slim tridens, and plains bristlegrass; 10 percent hooded windmillgrass; 10 percent sand dropseed and perennial three-awn; 10 percent other grasses; 5 percent guajillo, blackbrush, elbowbrush, spiny hackberry, shrubby blue salvia, and other woody plants; and 10 percent orange zexmenia, bush sunflower, daleas, velvet bundleflower, snoutbean, and annual forbs.

If this site is in excellent condition, it produces approximately 2,000 pounds of air-dry herbage per acre in favorable years and 1,000 pounds per acre in unfavorable years. Approximately 90 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, bluestems, tanglehead, and Arizona cottontop decrease, and slim tridens, bristlegrass, and three-awn increase. As retrogression continues, low quality grasses and a dense canopy of shrubby brush invade.

TIGHT SANDY LOAM RANGE SITE

The soils of this site are deep, nearly level to gently sloping fine sandy loams. They are slowly to very slowly permeable and have a medium available water capacity.

The climax plant community is an open grassland and scattered woody plants. The potential plant community is 25 percent little bluestem and fourflower trichloris; 15 percent pinhole bluestem and tanglehead; 10 percent Arizona cottontop and plains bristlegrass; 10 percent hooded windmillgrass; 15 percent buffalograss and curly mesquite; 15 percent other grasses; 5 percent kidneywood, vine-ephedra, and spiny hackberry; and 5 percent bush sunflower, orange zexmenia, American snoutbean, sensitivebrier, yellow neptunia, and other forbs.

If this site is in excellent condition, it produces approximately 4,800 pounds of air-dry herbage per acre in favorable years and 3,500 pounds per acre in unfavorable years. Approximately 90 percent of this production furnishes forage for cattle.

Under continuous heavy grazing by cattle, little bluestem, fourflower trichloris, and Arizona cottontop decrease. Such plants as bristlegrass, buffalograss, curly mesquite, and woody species increase (fig. 5). If overgrazing is prolonged, total production is greatly reduced.

Wildlife Habitat

Soils directly influence the kind and the amount of vegetation and the amount of water available, and thus indirectly influence the kind of wildlife that can live in an area. Soil properties that affect the growth of wildlife habitat are thickness of soil useful to crops, surface texture, available water capacity to a 40-inch depth, wetness, surface stoniness or rockiness, flood hazard, slope, and permeability of the soil to air and water.

In table 3 the soils of this survey area are rated for producing eight elements of wildlife habitat and for three groups, or kinds, of wildlife. The ratings indicate relative suitability for various elements. A rating of *good* means that wildlife habitat generally is easily created, improved, or maintained; that few or no limitations affect management; and that satisfactory results can be expected. A rating of *fair* means that habitat can be created, improved, or maintained in most places, but a moderate intensity of management and fairly frequent attention may be required for satisfactory results. A rating of *poor* means that the soil has severe limitations and that habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that the soil has very severe limitations; that unsatisfactory results are to be expected; and that it is impossible or impractical to create, improve, or maintain habitat.

The paragraphs that follow explain the headings in table 3.

Elements of wildlife habitat.—Each soil is rated in table 3 according to its suitability for producing various kinds of plants and other elements that provide wildlife habitat. The ratings take into account mainly the characteristics of the soils and closely related natural factors of the environment. They do not take into account climate, present use of the soils, or present distribution of wildlife and people. For this reason, the selection of a site for development as a habitat for wildlife requires an inspection at the site.

Grain and seed crops are annual grain-producing plants, such as corn, sorghum, millet, and soybeans.

Grasses and legumes are domestic grasses and legumes that are established by planting and that pro-

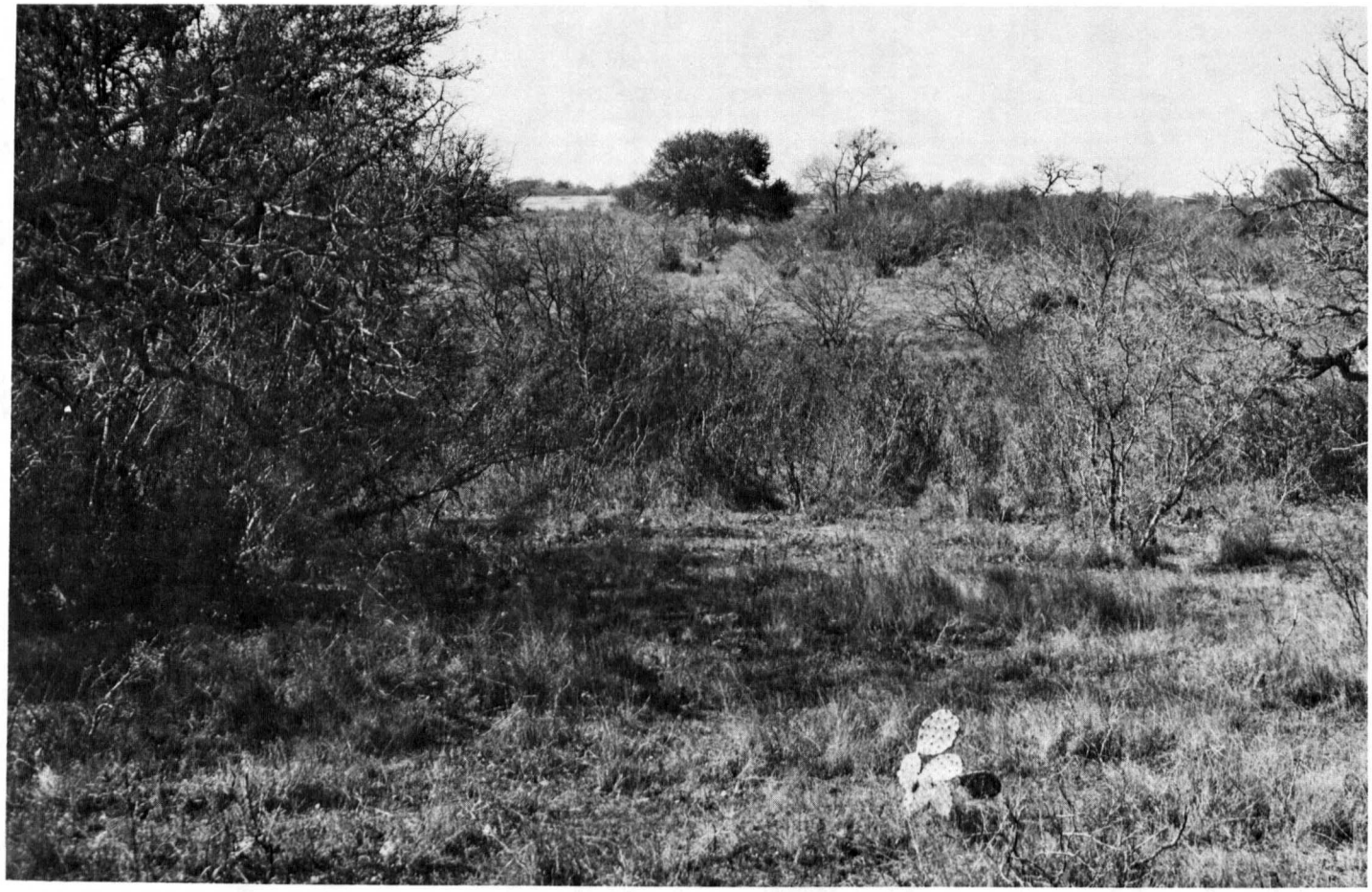

Figure 5.—**An infestation of brush and trees on Tight Sandy Loam range site. The soil is Papalote fine sandy loam.**

vide food and cover for wildlife. The grasses include bahiagrass, ryegrass, and panicgrass. The legumes are annual lespedeza, shrub lespedeza, and other clovers.

Wild herbaceous upland plants are native or introduced perennial grasses, forbs, and weeds that provide food and cover for upland wildlife. Beggarweed, perennial lespedeza, wild bean, pokeweed, and cheatgrass are typical examples. Typical range plants are bluestem, grama, perennial forbs, and legumes.

Shrubs and vines are nonconiferous shrubs that produce wildlife food in the form of fruits, nuts, buds, catkins, or browse. Such plants commonly grow in their natural environment, but they may be planted and developed through wildlife management programs. Typical species are dogwood, grape, honeysuckle, greenbrier, and silverberry.

Wetland food and cover plants are annual and perennial herbaceous plants that grow wild on moist and wet sites and that furnish food and cover mostly for wetland wildlife. Typical examples are smartweed, wild millet, spikerush and other rushes, sedges, burreed, tearthumb, and aneilema. Submerged and floating aquatics are not included in this category.

Shallow water developments are impoundments or excavations for controlling water, generally not more than 5 feet deep, to create habitat suitable for waterfowl. Some are designed to be drained, planted, and then flooded; others are permanent impoundments that grow submersed aquatics.

Kinds of wildlife.—Table 3 rates the soils according to their suitability as habitat for the three kinds of wildlife in the county—openland, rangeland, and wetland wildlife. These ratings are related to those made for the elements of habitat. For example, soils rated *very poor* for shallow water developments are rated *very poor* for wetland wildlife.

Openland wildlife are birds and mammals that normally live in meadows, pastures, and open areas where grasses, herbs, and shrubby plants grow. Quail, doves, meadowlarks, field sparrows, cottontail rabbits, and foxes are typical examples.

Rangeland wildlife are birds and mammals that normally live in rangeland areas where shrubs and vines grow. Wild turkeys, skunk, deer, coyotes, and raccoons are typical examples.

Wetland wildlife are birds and mammals that normally live in wet areas, marshes, and swamps. Ducks, geese, rails, shore birds, herons, minks, and muskrats are typical examples.

TABLE 3.—*Suitability for wildlife habitat*

Soil series and map symbols	Elements of wildlife habitat						Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Shrubs and vines	Wetland food and cover plants	Shallow water developments	Openland	Rangeland	Wetland
Branyon: BrA	Good	Good	Good	Fair	Very poor	Very poor	Good	Fair	Very poor.
Buchel: Bu	Good	Good	Poor	Fair	Poor	Poor	Fair	Poor	Poor.
Catilla: CaC	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Crockett: CrA, CrB, CrC, CsC2.	Fair	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor.
Cuero: CuB	Good	Good	Good	Fair	Poor	Poor	Good	Fair	Poor.
Degola:									
De	Good	Good	Fair	Good	Poor	Very poor	Good	Fair	Very poor.
Dg	Very poor	Poor	Fair	Good	Poor	Very poor	Poor	Fair	Very poor.
Denhawken: DuB	Good	Good	Fair	Good	Poor	Very poor	Good	Fair	Very poor.
Edna: EdA	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ellen	Poor	Poor	Fair	Good	Very poor	Very poor	Poor	Fair	Very poor.
Elmendorf	Good	Good	Fair	Good	Poor	Very poor	Good	Fair	Very poor.
Ferris: FeC2	Fair	Good	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor.
Fordtran: FoA	Poor	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Garcitas: GaB	Poor	Poor	Fair	Good	Poor	Poor	Poor	Fair	Poor.
Goldmire: GdD	Poor	Poor	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Heiden:									
HeB	Good	Good	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor.
HeC	Fair	Good	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor.
Houston Black: HoA, HoB	Good	Good	Poor	Fair	Poor	Poor	Fair	Fair	Poor.
Leemont: LeC, LeD	Fair	Good	Poor	Poor	Poor	Poor	Fair	Poor	Poor.
Leming: LmC	Fair	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor.
Lupe: LuD	Poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
Mabank: MaA, MaB	Fair	Good	Good	Fair	Fair	Fair	Good	Fair	Fair.
Meguin:									
Me	Good	Good	Fair	Good	Poor	Very poor	Good	Fair	Very poor.
Mf	Very poor	Poor	Fair	Good	Poor	Very poor	Poor	Fair	Very poor.
Miguel: MgC, MgC2	Fair	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor.

Monteola: MoA, MoB	Fair	Good	Poor	Poor	Poor	Very poor	Fair	Poor	Very poor.
Natraqualfs: Na	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor	Very poor.
Nueces: NsC	Fair	Poor	Good	Good	Poor	Poor	Fair	Good	Poor.
Orelia: OrB	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Papalote: PaA, PaB	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Runge: RuA, RuB, RuC	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Sarita	Fair	Fair	Fair	Good	Poor	Very poor	Fair	Fair	Very poor.
Sarnosa:									
SaA, SaB	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
SaC, SaD, SbC2	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
Shiner:									
ShC	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
ShD	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Silvern: SkD	Poor	Poor	Poor	Fair	Very poor	Very poor	Poor	Poor	Very poor.
Sinton: Sn	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Straber: StA, StC	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Tremona:									
TeC	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
TgC	Poor	Poor	Fair	Good	Very poor	Very poor	Poor	Fair	Very poor.
Trinity:									
To	Fair	Good	Fair	Good	Poor	Fair	Fair	Good	Poor.
Tr	Poor	Fair	Fair	Good	Poor	Fair	Fair	Fair	Poor.
Valco: VaD	Poor	Poor	Fair	Poor	Poor	Very poor	Poor	Poor	Very poor.
Weesatche:									
WeB	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
WeC	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Wilson: WsA, WsB	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Zalla: Za	Poor	Fair	Fair	Poor	Very poor	Very poor	Fair	Poor	Very poor.

Recreation

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In table 4 the soils of De Witt County are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

Limitations in table 4 are expressed as slight, moderate, or severe. It is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these, is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, and a surface free of rocks and coarse fragments. They are not flooded during periods of heavy use, and the surface is firm after rains but not dusty when dry.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrop, and good drainage. They are not flooded during periods of heavy use, and the surface is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads. The best soils are firm when wet but not dusty when dry. They are not flooded during the season of use and do not have slopes or stones that greatly increases cost of leveling sites or of building access roads.

Paths and trails are used for local and cross-country travel on foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded no more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Engineering [3]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, drainage condition, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who–

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, and 7, which show, respectively, estimates of soil properties significant in engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples. This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 4 and 6, and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially those that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally a depth greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning in soil science that may not be familiar to engineers. The Glossary defines many of these terms.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified Soil Classification System *(2)* used by SCS engineers and others and the AASHTO system adopted by the American Association of State Highway and Transportation Officials *(1)*.

In the Unified system *(2)* soils are classified in 15 groups according to particle-size distribution, plasticity, liquid limit, and organic matter. There are eight classes of coarse-grained soils, identified as GW, GP,

[3] R. K. CURL, civil engineer, Soil Conservation Service, helped prepare this section.

GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL-ML.

In the AASHTO system *(1)* soils are classified according to those properties that affect use in highway construction and maintenance. In this system, a soil is assigned to one of seven basic groups. The grouping is based on grain-size distribution, liquid limit, and plasticity index. The groups range from A–1 through A–7. In group A–1 are gravelly soils, which have high bearing strength and are the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils, which have low strength when wet and are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. The engineering value of a soil material can also be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHTO classification for tested soils, with group index numbers in parentheses, is shown in table 7. The estimated classification, without group index numbers, is shown in table 5 for all soils mapped in the survey area.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are listed in table 5. These estimates are for representative soil profiles, by layers that differ sufficiently to differ significantly in soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 5.

Hydrologic soil groups indicate runoff potential after rainfall. The soils are classified in four major groups on the basis of intake of water at the end of long duration storms occurring after prior wetting and opportunity for swelling, and without the protective effects of vegetation.

A. Soils having low runoff potential because of high infiltration rates even when they are thoroughly wetted. These soils are chiefly deep, well drained to excessively drained sand or gravel. Water readily passes through these soils. Thus, the soils have a high rate of water transmission.

B. Soils having moderate infiltration rates when thoroughly wetted. These are chiefly moderately deep to deep, moderately well drained to well drained soils that have a moderately fine texture to moderately coarse texture. They have a moderate rate of water transmission.

C. Soils having slow infiltration rates when thoroughly wetted. These are chiefly soils having a layer that impedes the downward movement of water or soils having moderately fine texture or fine texture. They have a slow rate of water transmission.

D. Soils having high runoff potential because of very slow infiltration rates when they are thoroughly wetted. These are chiefly clay soils that have a high swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. All have a very slow rate of water transmission.

Depth to bedrock is not listed in table 5. All but Shiner and Valco soils are deep. The Shiner soil is 10 to 20 inches deep over weakly cemented sandstone, and the Valco soil is 10 to 18 inches over strongly cemented and powdery caliche.

Depth to the seasonal high water table is not listed in table 5 because a seasonal high water table is not a problem in the soils of De Witt County.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added; for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic. If the moisture content is further increased, the material changes from a plastic to a liquid. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic; and the liquid limit, from a plastic to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 5. In table 7 data on liquid limit and plasticity index are based on tests of soil samples.

Permeability is the quality that enables a soil to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material when moisture content changes, that is, the extent to which the soil shrinks when dry or swells when wet. The extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. The shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

The risk of corrosion, as used in table 5, pertains

TABLE 4.—*Limitations for recreational facilities*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow the instructions in the first column of this table carefully. Some terms in this table are explained in the Glossary]

Soil series and map symbols	Camp areas	Playgrounds	Picnic areas	Paths and trails
Branyon: BrA	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Buchel: Bu	Severe: floods; percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Catilla: CaC	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy.
Crockett: CrA, CrB, CrC, CsC2	Severe: percs slowly	Severe: percs slowly	Slight	Slight.
Cuero: CuB	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
Degola:				
De	Severe: floods	Moderate: floods	Moderate: floods	Moderate: too clayey.
Dg	Severe: floods	Severe: floods	Severe: floods	Moderate: too clayey.
*Denhawken: DuB For Elmendorf part, see Elmendorf series.	Severe: percs slowly	Severe: percs slowly	Moderate: too clayey	Moderate: too clayey.
Edna: EdA	Severe: percs slowly; wet.	Severe: percs slowly; wet.	Severe: wet	Severe: wet.
Ellen Mapped only in complex with Silvern soils.	Moderate: small stones; too sandy.	Severe: small stones; too sandy.	Moderate: small stones; too sandy.	Moderate: small stones; too sandy.
Elmendorf Mapped only in complex with Denhawken soils.	Moderate: percs slowly; too clayey.	Moderate: percs slowly; too clayey.	Moderate: too clayey	Moderate: too clayey.
Ferris: FeC2	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Fordtran: FoA	Severe: percs slowly; wet.	Severe: percs slowly; too sandy; wet.	Moderate: wet	Moderate: wet.
Garcitas: GaB	Moderate: percs slowly; wet.	Severe: percs slowly; small stones.	Moderate: too sandy; wet.	Moderate: too sandy.
Goldmire: GdD	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones.
Heiden: HeB, HeC	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Houston Black: HoA, HoB	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Leemont: LeC, LeD	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Leming: LmC	Moderate: percs slowly; too sandy.	Moderate: percs slowly; too sandy.	Moderate: too sandy	Moderate: too sandy.
Lupe: LuD	Moderate: small stones	Moderate: small stones	Moderate: small stones	Moderate: small stones.
Mabank: MaA, MaB	Severe: percs slowly; wet.	Severe: percs slowly; wet.	Moderate: wet	Moderate: wet.

Meguin: Me	Severe: floods	Moderate: floods; too clayey.	Moderate: floods; too clayey.	Moderate: too clayey.
Mf	Severe: floods	Severe: floods	Severe: floods	Moderate: too clayey.
Miguel: MgC, MgC2	Moderate: percs slowly	Moderate: percs slowly	Slight	Slight.
Monteola: MoA, MoB	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Natraqualfs: Na. No valid estimates can be made.				
*Nueces: NsC. For Sarita part, see Sarita series.	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Orelia: OrB	Severe: percs slowly	Severe: percs slowly	Moderate: dusty; wet	Moderate: dusty; wet.
Papalote: PaA, PaB	Moderate: percs slowly	Slight	Slight	Slight.
Runge: RuA, RuB	Slight	Slight	Slight	Slight.
RuC	Slight	Moderate: slope	Slight	Slight.
Sarita. Mapped only in complex with Nueces soils.	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Sarnosa: SaA, SaB	Slight	Slight	Slight	Slight.
SaC, SbC2	Slight	Moderate: slope	Slight	Slight.
SaD	Slight	Severe: slope	Slight	Slight.
Shiner: ShC, ShD	Slight	Severe: depth to bedrock.	Slight	Slight.
*Silvern: SkD. For Ellen part, see Ellen series.	Moderate: small stones; too sandy.	Severe: small stones; too sandy.	Moderate: small stones; too sandy.	Moderate: small stones; too sandy.
Sinton: Sn	Severe: floods	Moderate: floods	Moderate: floods	Slight.
Straber: StA, StC	Moderate: percs slowly; too sandy.	Moderate: slope; too sandy.	Moderate: too sandy	Moderate: too sandy.
Tremona: TeC	Moderate: percs slowly; too sandy; wet.	Moderate: too sandy	Moderate: dusty; too sandy.	Moderate: dusty; too sandy.
TgC	Moderate: percs slowly; too sandy; wet.	Severe: small stones; too sandy.	Moderate: dusty; too sandy.	Moderate: dusty; too sandy.
Trinity: To, Tr	Severe: percs slowly; too clayey.	Severe: percs slowly; too clayey.	Severe: too clayey	Severe: too clayey.
Valco: VaD	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
Weesatche: WeB, WeC	Moderate: too clayey	Moderate: slope; too clayey.	Moderate: too clayey	Moderate: too clayey.
Wilson: WsA, WsB	Severe: percs slowly; wet.	Severe: percs slowly	Moderates: too clayey; wet.	Moderate: too clayey; wet.
Zalla: Za	Severe: floods	Moderate: floods; too sandy.	Moderate: floods; too sandy.	Moderate: too sandy.

TABLE 5.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soils in such first colum of this table carefully.

Soil series and map symbols	Hydrologic soil group	Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
				Unified	AASHTO	
		Inches				*Percent*
Branyon: BrA	D	0–84	Clay and silty clay	CH	A–7–6	
Buchel: Bu	D	0–84	Clay	CH	A–7–6	
Catilla: CaC	B	0–46	Fine sand	SM or SP–SM	A–2–4 or A–3	
		46–75	Sandy clay loam	CL or SC	A–2–4, A–2–6, A–4, or A–6	
Crockett: CrA, CrB, CrC, CsC2	D	0–9	Fine sandy loam	CL, ML, SC, SM, CL–ML, or SM–SC	A–4 or A–6	
		9–57	Clay, sandy clay, and sandy clay loam.	CH or CL	A–6 or A–7–6	
		57–84	Loam	CL	A–6 or A–7–6	
Cuero: CuB	B	0–8	Sandy clay loam	CL or SC	A–2–4, A–2–6, A–4 or A–6	
		8–40	Sandy clay loam and clay loam.	CL or SC	A–6 or A–7–6	
		40–63	Clay loam	CL or SC	A–6	
		63–90	Weakly cemented calcareous sandstone.			
Degola: De, Dg	B	0–30	Clay loam	CL or SC	A–6	
		30–70	Sandy clay loam	CL or SC	A–6	
*Denhawken: DuB For Elmendorf part, see Elmendorf series.	D	0–6	Clay loam	CL	A–6	0–2
		6–82	Clay loam	CH or CL	A–7–6	0–2
Edna: EdA	D	0–7	Fine sandy loam	CL, CL–ML, SC, or SM–SC	A–4 or A–6	
		7–34	Clay	CH	A–7–6	
		34–84	Sandy clay loam	CH or CL	A–7–6 or A–6	
Ellen Mapped only in complex with Silvern soils.	B	0–28	Gravelly or very gravelly loamy sand.	GM, GP–GM, SM, or SP–SM	A–1	0–10
		28–84	Gravelly or very gravelly sandy clay loam.	GC, GP–GC, SC, or SP–SC	A–2–7	0–15
Elmendorf Mapped only in complex with Denhawken soils.	D	0–16	Clay loam	CL	A–6 or A–7	0–2
		16–80	Clay loam	CH or CL	A–7	0–2
Ferris: FeC2	D	0–62	Clay	CH	A–7–6	
Fordtran: FoA	C	0–28	Loamy fine sand	SM or SM-SC	A–2–4	
		28–48	Sandy clay	CH or CL	A–7–6	
		48–72	Sandy clay loam	CL or SC	A–6 or A–7–6	
Garcitas: GaB	C	0–24	Gravelly or very gravelly loamy fine sand.	GM, GP–GM, SM, or SP–SM	A–1	0–5
		24–58	Gravelly clay	CH, CL, GC, or SC	A–2–7 or A–7–6	0–5
		58–84	Clay loam and sandy clay loam.	CL or SC	A–2–6, A–2–7, A–6, or A–7–6	

significant in engineering

mapping units may have different properties and limitations, and for this reason it is necessary to follow the instructions in the
The symbol < means less than]

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH*			
95–100	80–100	80–100	75–100	60–90	35–65	<0.06	0.15–0.18	7.9–8.4	Very high	Very high	Low.
95–100	95–100	90–100	75–95	55–70	32–44	<0.06	0.12–0.18	7.9–8.4	High	High	Low.
90–100	85–100	80–100	8–25	<25	[1] NP–3	6.0–20.0	0.05–0.08	5.6–6.5	Very low	Low	Moderate.
90–100	85–100	80–100	25–55	25–40	8–20	0.2–0.6	0.12–0.16	4.5–6.0	Low	Moderate	Moderate.
95–100	95–100	95–100	36–95	15–35	3–15	0.6–2.0	0.11–0.15	5.6–7.3	Low	Low	Low.
90–100	80–100	75–100	65–91	40–60	20–38	<0.06	0.14–0.18	6.1–7.8	High	High	Low.
95–100	95–100	90–100	65–90	30–45	11–25	0.06–0.2	0.15–0.20	6.1–8.4	Moderate	High	Low.
95–100	95–100	70–95	30–70	25–35	8–15	0.6–2.0	0.11–0.19	6.6–7.8	Low	Moderate	Low.
95–100	95–100	80–100	40–80	30–44	11–22	0.6–2.0	0.15–0.22	7.4–8.4	Moderate	Moderate	Low.
85–100	85–100	80–90	36–55	30–40	11–20	0.6–2.0	0.15–0.19	7.9–8.4	Moderate	High	Low.
95–100	95–100	80–100	40–80	28–40	10–18	0.6–2.0	0.12–0.20	6.6–7.3	Low	Moderate	Low.
95–100	95–100	80–100	40–80	28–40	10–18	0.6–2.0	0.12–0.20	6.6–7.8	Low	Moderate	Low.
95–100	90–100	90–100	65–90	30–40	18–25	0.2–0.6	0.15–0.20	7.9–8.4	Moderate	High	Low.
95–100	90–100	90–100	75–95	45–55	25–35	<0.06	0.14–0.18	7.9–8.4	High	High	Low.
100	100	90–100	45–60	<30	4–13	0.6–2.0	0.10–0.15	5.6–7.3	Low	High	Low.
100	98–100	90–100	60–80	51–72	28–46	<0.06	0.15–0.20	5.6–7.3	High	High	Low.
98–100	98–100	80–100	60–70	35–60	18–35	<0.06	0.15–0.20	6.6–8.4	High	High	Low.
20–70	10–60	5–38	2–15	<20	NP–3	6.0–20.0	0.01–0.04	5.6–6.5	Very low	Low	Moderate.
40–85	12–70	10–45	5–25	43–60	25–42	0.2–0.6	0.06–0.12	3.6–5.5	Low	Moderate	High.
95–100	90–100	90–100	65–90	30–50	15–28	0.2–0.6	0.15–0.20	6.6–8.4	Moderate	High	Low.
95–100	90–100	90–100	75–95	45–65	25–40	<0.06	0.15–0.20	7.9–8.4	High	High	Low.
95–100	95–100	80–95	75–95	51–70	35–50	<0.06	0.15–0.18	7.9–8.4	Very high	High	Low.
80–100	80–100	40–95	13–30	<25	NP–6	2.0–6.0	0.07–0.11	5.1–6.5	Low	Low	Moderate.
90–100	90–100	80–100	51–90	41–55	20–30	<0.06	0.15–0.18	5.1–6.5	Moderate	High	Moderate.
90–100	80–100	70–100	36–95	30–49	12–30	<0.06	0.15–0.20	6.1–8.4	Moderate	High	Low.
25–80	15–78	12–50	5–20	<20	NP–3	6.0–20.0	0.02–0.06	5.6–6.5	Low	Moderate	Moderate.
65–90	50–80	40–75	22–70	41–55	21–35	<0.06	0.08–0.15	3.6–6.0	Moderate	High	High.
90–100	78–100	60–95	25–75	30–49	12–28	0.06–2.0	0.08–0.15	4.5–6.5	Moderate	High	High.

TABLE 5.—*Estimates of soil properties*

Soil series and map symbols	Hydrologic soil group	Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
				Unified	AASHTO	
		Inches				*Percent*
Goldmire: GdD	C	0–3	Very gravelly loamy sand.	GM, GP–GM, SP, or SP–SM	A–1	0–15
		3–42	Very gravelly sandy clay loam.	GC or GP–GC	A–2–7	0–5
		42–80	Gravelly sandy clay loam.	GC or SC	A–2–7 or A–7–6	0–5
Heiden: HeB, HeC	D	0–30	Clay	CH	A–7–6	
		30–80	Clay, silty clay	CH	A–7–6	
Houston Black: HoA, HoB	D	0–86	Clay	CH	A–7–6	
Leemont: LeC, LeD	D	0–80	Clay	CH	A–7–6	
Leming: LmC	C	0–26	Loamy fine sand	SM or SM–SC	A–2–4	
		26–68	Sandy clay and sandy clay loam.	CL or SC	A–6 or A–7–6	
		68–84	Loamy fine sand	SM or SM–SC	A–2–4	
Lupe: LuD	B	0–12	Gravelly sandy clay loam.	GC or SC	A–2–4, A–2–6, A–4, or A–6	0–5
		12–32	Very gravelly sandy clay loam.	GC or GP–GC	A–2–4 or A–2–6	0–5
		32–84	Gravelly fine sandy loam and loam.	CL, GC, or SC	A–2–4, A–2–6, A–4, or A–6	
Mabank: MaA, MaB	D	0–7	Fine sandy loam	CL, ML, SC, SM, CL–ML, or SM–SC	A–4	
		7–84	Clay and sandy clay loam.	CH or CL	A–6 or A–7–6	
Meguin: Me, Mf	B	0–12	Silty clay loam	CL	A–6 or A–7–6	
		12–62	Silty clay loam and loam.	CL	A–6 or A–7–6	
Miguel: MgC, MgC2	D	0–6	Fine sandy loam	SM, SM–SC, or SC	A–2–4	
		6–30	Clay	CH, CL, or SC	A–6 or A–7–6	
		30–60	Sandy clay and sandy clay loam.	CL or SC	A–6 or A–7–6	
Monteola: MoA, MoB	D	0–5	Clay	CH	A–7–6	0–3
		5–84	Clay	CH	A–7–6	0–3
Natraqualfs: Na. No valid estimates can be made.						
*Nueces: NsC For Sarita part, see Sarita series.	C	0–34	Fine sand	SM, SM–SC, or SP–SM	A–2–4	
		34–72	Sandy clay loam	SC	A–2–6 or A–6	
Orelia: OrB	D	0–4	Fine sandy loam	CL or SC	A–4 or A–6	
		4–80	Sandy clay loam	CL	A–6 or A–7–6	
Papalote: PaA, PaB	C	0–9	Fine sandy loam	SC, SM–SC, or SM	A–2–4 or A–4	
		9–48	Sandy clay loam and clay loam.	CH, CL, or SC	A–7–6	
		48–82	Sandy clay loam	CL or SC	A–6 or A–7–6	
Runge: RuA, RuB, RuC	B	0–15	Fine sandy loam	SM or SM–SC	A–2–4 or A–4	
		15–80	Sandy clay loam	CL or SC	A–6 or A–7–6	
Sarita Mapped only in complex with Nueces soils.	A	0–50	Fine sand	SM, SM–SC, or SP–SM	A–2–4	
		50–90	Sandy clay loam and fine sandy loam.	SC	A–2–6 or A–6	

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH*			
20–55	18–50	9–40	2–15	<25	NP–3	6.0–20.0	0.01–0.03	4.5–6.0	Very low	Low	Moderate.
20–55	18–50	15–45	6–30	43–60	25–42	0.2–0.6	0.06–0.12	3.6–5.5	Low	Moderate	High.
40–80	35–75	25–70	13–40	43–60	25–42	0.2–0.6	0.08–0.14	3.6–5.5	Low	Moderate	High.
95–100	90–100	80–100	75–99	54–80	38–55	<0.06	0.15–0.20	7.9–8.4	Very high	High	Low.
80–100	90–100	75–100	70–99	52–80	38–55	<0.06	0.15–0.20	7.9–8.4	Very high	High	Low.
95–100	95–100	95–100	85–100	58–90	34–65	<0.06	0.15–0.20	7.9–8.4	Very high	High	Low.
90–100	85–100	85–100	80–90	51–60	35–45	<0.06	0.15–0.20	7.4–8.4	High	High	Low.
95–100	95–100	50–75	20–35	20–30	2–6	2.0–6.0	0.05–0.10	6.1–7.3	Very low	Low	Low.
95–100	95–100	85–95	45–60	35–45	15–30	0.06–0.2	0.15–0.20	6.1–8.4	Moderate	High	Low.
95–100	95–100	50–75	20–35	20–30	2–6	2.0–6.0	0.05–0.10	6.6–8.4	Very low	High	Low.
35–80	35–78	24–70	12–49	25–35	8–15	0.6–2.0	0.06–0.20	7.9–8.4	Low	Moderate	Low.
15–60	15–50	12–45	5–35	30–40	8–15	0.6–2.0	0.09–0.18	7.9–8.4	Low	Moderate	Low.
35–100	35–98	24–80	12–65	25–35	8–15	0.6–2.0	0.06–0.20	7.9–8.4	Low	Moderate	Low.
95–100	95–100	80–98	40–70	<30	NP–10	0.6–2.0	0.11–0.15	6.1–7.3	Low	Moderate	Moderate.
95–100	95–100	95–100	60–85	35–65	20–40	<0.06	0.12–0.18	5.6–8.4	High	High	Moderate.
95–100	95–100	90–100	75–95	35–48	16–25	0.6–2.0	0.15–0.22	7.9–8.4	Moderate	Moderate	Low.
95–100	90–100	90–100	75–95	30–48	11–25	0.6–2.0	0.15–0.22	7.9–8.4	Moderate	Moderate	Low.
100	95–100	90–100	15–35	15–25	2–8	2.0–6.0	0.10–0.15	6.1–7.3	Low	Low	Low.
100	95–100	90–100	45–70	40–55	20–30	<0.06	0.14–0.17	6.6–7.8	Moderate	High	Low.
95–100	90–100	90–100	40–70	30–45	20–30	0.6–0.2	0.12–0.15	7.4–8.4	Low	High	Low.
80–100	80–100	80–100	75–90	51–60	30–38	<0.06	0.10–0.20	7.9–8.4	Very high	High	Low.
90–100	80–100	75–100	75–90	56–76	33–50	<0.06	0.10–0.17	7.9–8.4	Very high	High	Low.
100	95–100	90–100	10–35	<25	NP–6	2.0–6.0	0.05–0.10	6.1–7.3	Low	Low	Low.
100	95–100	90–100	20–49	27–40	11–20	0.2–0.6	0.12–0.17	6.1–8.4	Moderate	Moderate	Low.
98–100	95–100	80–100	45–60	25–35	9–19	0.2–0.6	0.10–0.16	6.1–7.3	Low	High	Low.
98–100	90–100	80–100	55–75	37–49	20–29	<0.06	0.09–0.17	7.4–8.4	Moderate	High	Low.
95–100	95–100	90–100	25–49	<25	NP–8	2.0–6.0	0.11–0.15	6.1–7.3	Low	Low	Low.
95–100	90–100	85–100	45–70	41–60	21–35	0.06–0.2	0.13–0.18	6.6–7.8	Moderate	High	Low.
95–100	80–100	75–95	40–70	38–48	18–27	0.06–0.2	0.12–0.17	7.4–8.4	Moderate	High	Low.
100	95–100	95–100	25–45	<25	NP–7	2.0–6.0	0.11–0.16	6.1–7.8	Low	Low	Low.
100	90–100	85–100	45–65	30–44	11–22	0.6–2.0	0.14–0.20	6.6–8.4	Moderate	Moderate	Low.
100	100	65–100	9–35	<25	NP–7	6.0–20.0	0.05–0.10	6.1–7.3	Low	Low	Low.
100	100	80–100	30–49	28–40	11–22	2.0–6.0	0.13–0.19	6.1–8.4	Moderate	Moderate	Low.

TABLE 5.—*Estimates of soil properties*

Soil series and map symbols	Hydrologic soil group	Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
				Unified	AASHTO	
		Inches				*Percent*
Sarnosa: SaA, SaB, SaC, SaD, SbC2.	B	0–52	Fine sandy loam and sandy clay loam.	SC	A–2–6, A–2–7, A–6, or A–7–6	
		52–80	Fine sandy loam	SC or SM–SC	A–2–4 or A–4	
Shiner: ShC, ShD	C	0–6	Fine sandy loam	SC or SM–SC	A–2–4, A–2–6, A–4, or A–6	0–5
		6–16	Gravelly fine sandy loam.	SC, SM–SC, GC, or GP–GM	A–2–4, A–2–6, A–4, or A–6	0–10
		16–70	Weakly cemented sandstone and sandy loam.			
*Silvern: SkD For Ellen part, see Ellen series.	A	0–54	Very gravelly loamy sand.	GP, GP–GM, or GC–GP	A–1–a	5–30
		54–76	Very gravelly sandy clay loam.	GC, GP–GC, SC, or SP–SC	A–2–6 or A–2–7	5–25
		76–100	Gravelly sandy clay loam.	GC, GP–GC, SP–SC, or SC	A–2–6, A–2–7, A–6, or A–7–6	0–5
Sinton: Sn	B	0–26	Loam and sandy clay loam.	CL	A–4 or A–6	
		26–84	Loam	SC, SM, or SM–SC	A–2–4 or A–2–6	
Straber: StA, StC	C	0–14	Loamy fine sand	SM or SM–SC	A–2–4	0–2
		14–48	Sandy clay	CH, CL, or SC	A–7–6	0–2
		48–78	Clay loam and sandy clay loam.	CH, CL, or SC	A–6 or A–7–6	
Tremona:						
TeC	C	0–28	Loamy fine sand	SM or SP–SM	A–2–4 or A–3	
		28–58	Sandy clay	CH, CL, or SC	A–7–6	
		58–84	Sandy clay loam	CH, CL, or SC	A–2–6, A–2–7, A–6, or A–7–6	
TgC	C	0–32	Gravelly loamy sand.	GM, GP–GM, SM, or SP–SM	A–1 or A–3	0–5
		32–64	Clay	CH, CL, or SC	A–7–6	
		64–80	Sandy clay loam	CH, CL, or SC	A–6, A–7–6, A–2–6, or A–2–7	
Trinity: To, Tr	D	0–82	Clay	CH or CL	A–7–6	
Valco: VaD	C	0–10	Sandy clay loam	CL	A–6	0–5
		10–84	Strongly cemented to powdery caliche.			
Weesatche: WeB, WeC	B	0–8	Sandy clay loam	CL or SC	A–2–6, A–2–7, A–6, or A–7–6	
		8–38	Sandy clay loam	CL or SC	A–2–6, A–2–7, A–6, or A–7–6	
		38–84	Loam and weakly cemented fine sandstone.	CL or SC	A–2–6, A–2–7, A–6, or A–7–6	
Wilson: WsA, WsB	D	0–8	Clay loam	CL	A–4 or A–6	
		8–84	Clay	CH or CL	A–7–6	
Zalla: Za	A	0–62	Fine sand, sand, loamy sand, sandy loam, and loamy fine sand.	SM or SM-SC	A–2–4	

[1] NP means nonplastic.

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Risk of corrosion—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH*			
95–100	95–100	70–90	20–45	30–45	11–25	0.6–2.0	0.10–0.15	7.9–8.4	Low	Moderate	Low.
80–100	80–100	60–85	20–45	20–30	4–10	2.0–6.0	0.06–0.12	7.9–8.4	Low	Moderate	Low.
75–100	75–100	45–75	20–49	20–30	6–15	0.6–2.0	0.10–0.15	7.9–8.4	Low	Moderate	Low.
50–85	50–85	30–70	10–40	20–30	6–15	0.6–2.0	0.06–0.12	7.9–8.4	Low	Moderate	Low.
20–45	15–40	7–25	2–11	<20	NP–5	6.0–20.0	0.01–0.04	5.1–6.5	Very low	Low	Moderate.
25–60	20–55	15–35	8–30	28–50	14–35	0.6–2.0	0.05–0.10	3.6–5.5	Low	Moderate	High.
40–80	35–75	20–65	9–40	40–60	20–40	0.6–2.0	0.05–0.12	3.6–5.5	Low	Moderate	High.
100	95–100	80–95	60–80	28–40	9–22	0.6–2.0	0.15–0.20	7.9–8.4	Low	Moderate	Low.
100	90–100	50–70	20–35	<30	NP–14	2.0–6.30	0.07–0.15	7.9–8.4	Low	Moderate	Low.
85–100	80–100	50–75	15–35	<25	NP–6	2.0–6.0	0.07–0.11	5.6–6.5	Low	Low	Moderate.
85–100	80–100	70–100	45–85	45–60	25–40	0.06–0.2	0.14–0.18	4.5–5.5	Moderate	High	High.
90–100	85–100	75–100	40–70	35–55	15–35	0.06–0.2	0.11–0.18	5.6–8.4	Moderate	High	Low.
80–100	80–100	60–95	8–28	<25	NP–3	6.0–20.0	0.04–0.10	5.6–6.5	Very low	Low	Moderate.
80–100	80–100	75–100	36–85	45–60	30–44	<0.06	0.12–0.18	4.5–6.0	High	High	High.
80–100	80–100	70–100	30–85	40–60	20–40	<0.06	0.12–0.18	5.1–8.4	High	High	Moderate.
20–80	15–80	10–75	6–20	<25	NP–6	6.0–20.0	0.01–0.07	5.6–6.5	Very low	Low	Moderate.
80–100	80–100	75–100	36–85	45–60	30–44	<0.06	0.12–0.18	4.5–6.0	High	High	High.
80–100	80–100	70–100	30–85	40–60	20–40	<0.06	0.12–0.18	5.1–8.4	High	High	Moderate.
100	98–100	85–100	80–95	41–60	20–40	<0.06	0.15–0.20	7.9–8.4	High	High	Low.
80–95	65–90	60–80	51–70	27–37	11–20	0.6–2.0	0.13–0.18	7.9–8.4	Low	High	Low.
80–100	80–100	65–95	28–65	35–45	20–28	0.6–2.0	0.12–0.17	6.6–7.8	Moderate	Moderate	Low.
80–100	80–100	65–95	28–65	38–49	24–30	0.6–2.0	0.15–0.20	6.6–8.4	Moderate	High	Low.
80–100	80–100	55–100	28–86	38–49	20–30	0.6–2.0	0.10–0.15	7.9–8.4	Moderate	High	Low.
95–100	85–100	80–100	60–85	25–35	8–20	0.2–0.6	0.15–0.20	6.1–7.8	Low	Low	Low.
90–100	80–100	80–100	65–90	41–55	25–35	<0.06	0.14–0.20	6.1–8.4	High	High	Low.
95–100	95–100	70–85	13–25	<25	NP–7	6.0–20.0	0.05–0.10	7.9–8.4	Very low	Low	Low.

TABLE 6.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit is made up of two or more kinds of soil. The soil in such first column of this table carefully. Some terms

Soil series and map symbols	Degree and kind of limitations for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfill	Local roads and streets
Branyon: BrA	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Buchel: Bu	Severe: floods; percs slowly.	Severe: floods.	Severe: floods; too clayey.	Severe: floods; low strength; shrink swell.	Severe: floods; too clayey.	Severe: floods; low strength; shrink swell.
Catilla: CaC	Moderate: percs slowly.	Severe: seepage.	Severe: cutbanks cave.	Slight	Severe: too sandy.	Slight
Crockett: CrA, CrB	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
CrC, CsC2	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Cuero: CuB	Slight	Moderate: seepage.	Slight	Moderate: shrink swell.	Slight	Moderate: low strength; shrink swell.
Degola: De, Dg	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
*Denhawken: DuB For Elmendorf part, see Elmendorf series.	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Edna: EdA	Severe: percs slowly.	Slight	Severe: too clayey; wet.	Severe: low strength; shrink swell; wet.	Severe: too clayey; wet.	Severe: low strength; shrink swell; wet.
Ellen Mapped only in complex with Silvern soils.	Severe: percs slowly.	Severe: seepage; small stones.	Severe: small stones.	Slight	Severe: small stones; too sandy.	Slight
Elmendorf Mapped only in complex with Denhawken soils.	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: shrink swell.	Severe: too clayey.	Severe: shrink swell.
Ferris: FeC2	Severe: percs slowly.	Moderate: slope.	Severe: cutbanks cave; too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Fordtran: FoA	Severe: percs slowly.	Severe: seepage.	Severe: cutbanks cave; wet.	Moderate: wet.	Severe: wet.	Moderate: wet.
Garcitas: GaB	Severe: percs slowly.	Severe: seepage.	Severe: cutbanks cave; wet.	Moderate: wet.	Severe: too clayey; wet.	Moderate: shrink swell; wet.
Goldmire: GdD	Severe: percs slowly.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.	Moderate: seepage.
Heiden: HeB, HeC	Severe: percs slowly.	Moderate: slope.	Severe: cutbanks cave; too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.

interpretations

mapping units may have different properties and limitations, and for this reason it is necessary to follow the instructions in the in this table are defined in the Glossary]

Degree and kind of limitations for—Cont.		Suitability as source of—		Soil features affecting—			
Pond reservoir areas	Pond embankments	Road fill	Topsoil	Drainage	Irrigation	Terraces and diversions	Waterways
Slight	Moderate: hard to pack; unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Percs slowly	Slow intake	Favorable	Favorable.
Slight	Moderate: hard to pack; unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Percs slowly	Slow intake	Not needed	Favorable.
Severe: seepage.	Moderate: piping.	Good	Poor: too sandy.	Not needed	Droughty; fast intake.	Erodes easily; piping; too sandy.	Droughty.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Fair: thin layer.	Not needed	Percs slowly	Favorable	Favorable.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Fair: thin layer.	Not needed	Percs slowly; slope.	Favorable	Favorable.
Moderate: seepage.	Moderate: piping.	Fair: low strength; shrink swell.	Fair: too clayey.	Not needed	Favorable	Favorable	Favorable.
Moderate: seepage.	Moderate: piping.	Fair: low strength.	Fair: too clayey.	Floods	Floods	Floods	Favorable.
Slight	Moderate: shrink swell; unstable fill.	Poor: low strength; shrink swell.	Fair: too clayey.	Not needed	Percs slowly	Favorable	Favorable.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell; wet.	Poor: wet	Percs slowly	Percs slowly; slow intake; wet.	Percs slowly; wet.	Percs slowly; wet.
Moderate: seepage.	Moderate: piping; seepage.	Good	Poor: small stones; too sandy.	Not needed	Droughty; fast intake.	Piping; small stones; too sandy.	Droughty; small stones.
Slight	Moderate: unstable fill.	Poor: shrink swell.	Fair: too clayey.	Not needed	Percs slowly	Favorable	Favorable.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Not needed	Slow intake	Percs slowly	Percs slowly.
Slight	Moderate: piping.	Fair: wet	Poor: too sandy.	Cutbanks cave; percs slowly.	Wet	Too sandy	Erodes easily; wet.
Slight	Moderate: piping.	Fair: shrink swell.	Poor: small stones; too sandy.	Cutbanks cave; percs slowly.	Droughty	Small stones; too sandy.	Droughty.
Slight	Slight	Good	Poor: small stones.	Small stones	Droughty; small stones.	Small stones	Droughty; small stones.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Not needed	Slow intake	Percs slowly	Percs slowly.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitations for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfill	Local roads and streets
Houston Black: HoA, HoB	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Leemont: LeC, LeD	Severe: percs slowly.	Moderate: slope.	Severe: cutbanks cave; too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Leming: LmC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Moderate: too clayey.	Moderate: low strength; shrink swell.
Lupe: LuD	Moderate: percs slowly.	Moderate: seepage; slope.	Moderate: small stones.	Slight	Severe: small stones.	Slight
Mabank: MaA, MaB	Severe: percs slowly; wet.	Slight	Severe: too clayey; wet.	Severe: shrink swell; wet.	Severe: too clayey.	Severe: low strength; shrink swell.
Meguin: Me, Mf	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods; low strength.
Miguel: MgC, MgC2	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: shrink swell.	Severe: too clayey.	Severe: low strength.
Monteola: MoA, MoB	Severe: percs slowly.	Slight	Severe: cutbanks cave; too clayey.	Severe: low strength; shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Natraqualfs: Na. No valid estimate can be made.						
*Nueces: NsC. For Sarita part, see Sarita series.	Severe: percs slowly.	Moderate: slope.	Moderate: cutbanks cave.	Slight	Slight	Moderate: low strength.
Orelia: OrB	Severe: percs slowly.	Slight	Moderate: wet.	Moderate: low strength; shrink swell; wet.	Moderate: wet.	Moderate: low strength; shrink swell; wet.
Papalote: PaA, PaB	Severe: percs slowly.	Slight	Slight	Moderate: shrink swell.	Slight	Moderate: low strength; shrink swell.
Runge: RuA, RuB, RuC	Slight	Moderate: seepage.	Slight	Moderate: shrink swell.	Slight	Moderate: low strength; shrink swell.
Sarita. Mapped only in complex with Nueces soils.	Slight	Severe: seepage.	Severe: cutbanks cave; too sandy.	Slight	Severe: seepage.	Moderate: low strength.
Sarnosa: SaA, SaB, SaC, SaD, SbC2.	Slight	Moderate: seepage; slope.	Slight	Slight	Severe: seepage.	Slight
Shiner: ShC, ShD	Slight	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Severe: seepage.	Moderate: depth to rock.

interpretations—Continued

Degree and kind of limitations for—Cont.		Suitability as source of—		Soil features affecting—			
Pond reservoir areas	Pond embankments	Road fill	Topsoil	Drainage	Irrigation	Terraces and diversions	Waterways
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Percs slowly	Slow intake	Percs slowly	Percs slowly.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Cutbanks cave; percs slowly.	Slow intake	Percs slowly; slope.	Percs slowly; slope.
Slight	Moderate: piping.	Fair: low strength.	Poor: too sandy.	Cutbanks cave.	Fast intake; slope.	Too sandy	Erodes easily.
Severe: seepage.	Slight	Good	Poor: small stones.	Not needed	Small stones	Slope	Favorable.
Slight	Moderate: unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Percs slowly	Percs slowly; slow intake.	Percs slowly	Percs slowly.
Moderate: seepage.	Moderate: piping.	Poor: low strength.	Fair: too clayey.	Not needed	Favorable	Not needed	Favorable.
Slight	Slight	Poor: low strength.	Fair: thin layer.	Not needed	Percs slowly; slope.	Percs slowly	Percs slowly.
Slight	Moderate: compressible.	Poor: low strength; shrink swell.	Poor: too clayey.	Percs slowly	Percs slowly	Percs slowly	Percs slowly.
Moderate: seepage.	Moderate: erodes easily; piping; unstable fill.	Fair: low strength.	Poor: too sandy.	Not needed	Fast intake; too sandy.	Erodes easily; piping.	Erodes easily.
Slight	Moderate: compressible.	Poor: low strength.	Poor: thin layer.	Percs slowly	Droughty; slow intake.	Percs slowly; wet.	Droughty; percs slowly.
Moderate: seepage:	Slight	Fair: low strength; shrink swell.	Fair: thin layer.	Percs slowly	Favorable	Favorable	Favorable.
Moderate: seepage.	Moderate: compressible.	Fair: low strength; shrink swell.	Fair: thin layer.	Not needed	Favorable	Favorable	Favorable.
Severe: seepage:	Severe: seepage; unstable fill.	Fair: low strength.	Poor: too sandy.	Not needed	Droughty; fast intake.	Too sandy	Droughty.
Severe: seepage.	Slight	Good	Fair: excess lime.	Not needed	Slope	Slope	Slope.
Severe: seepage.	Severe: seepage.	Fair: low strength.	Poor: excess lime.	Not needed	Droughty; excess lime; rooting depth.	Depth to rock; piping.	Droughty; rooting depth.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitations for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfill	Local roads and streets
*Silvern: SkD For Ellen part, see Ellen series.	Slight	Severe: seepage; small stones.	Severe: small stones.	Slight	Severe: small stones; too sandy.	Slight
Sinton: Sn	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Straber:						
StA	Severe: percs slowly.	Slight	Moderate: too clayey.	Moderate: shrink swell.	Moderate: too clayey.	Moderate: low strength; shrink swell.
StC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Moderate: shrink swell.	Moderate: too clayey.	Moderate: low strength; shrink swell.
Tremona: TeC, TgC	Severe: percs slowly.	Severe: seepage.	Severe: cut-banks cave.	Moderate: wet.	Moderate: wet.	Moderate: wet.
Trinity: To, Tr	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; shrink swell; wet.	Severe: floods; too clayey; wet.	Severe: floods; shrink swell.
Valco: VaD	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
Weesatche: WeB, WeC	Moderate: percs slowly.	Moderate: seepage.	Slight	Moderate: shrink swell.	Slight	Moderate: low strength; shrink swell.
Wilson: WsA, WsB	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: shrink swell.	Severe: too clayey.	Severe: low strength; shrink swell.
Zalla: Za	Severe: floods.	Severe: floods; seepage.	Severe: floods; too sandy.	Severe: floods.	Severe: floods; seepage.	Moderate: floods.

to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is influenced mainly by the content of sodium or magnesium sulfate and to a lesser extent by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than those entirely in one kind of soil or in one soil horizon. A corrosion rating of *low* indicates a low probability of soil-induced corrosion damage. A rating of *high* indicates a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations

The estimated interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of De Witt County. Ratings in table 6 summarize the limitation or suitability of the soils for all listed purposes, except for pond reservoir areas, embankments, dikes, levees, and waterways. For these particular uses, table 6 lists those soil features to be considered in planning, installation, and maintenance.

Limitations are expressed as slight, moderate, and severe. *Slight* indicates soil properties generally favorable for the rated use, or limitations that are minor and easily overcome. *Moderate* indicates that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* indicates soil properties so unfavorable and so difficult to overcome that major soil reclamation, special design, or intensive maintenance is required.

interpretations—Continued

Degree and kind of limitations for—Cont.		Suitability as source of—		Soil features affecting—			
Pond reservoir areas	Pond embankments	Road fill	Topsoil	Drainage	Irrigation	Terraces and diversions	Waterways
Severe: seepage.	Severe: seepage.	Good	Poor: small stones; too sandy.	Not needed	Droughty; fast intake.	Piping; small stones; too sandy.	Droughty; small stones.
Severe: seepage.	Moderate: compressible; piping.	Moderate: low strength.	Moderate: thin layer.	Floods	Floods	Favorable	Favorable.
Slight	Moderate: compressible.	Fair: low strength; shrink swell.	Poor: too sandy.	Percs slowly	Percs slowly	Percs slowly	Favorable.
Slight	Moderate: compressible.	Fair: low strength; shrink swell.	Poor: too sandy.	Percs slowly	Percs slowly	Percs slowly	Favorable.
Slight	Moderate: piping.	Fair: shrink swell; wet.	Poor: too sandy.	Cutbanks cave; percs slowly.	Droughty; erodes easily.	Erodes easily; piping; too sandy.	Droughty.
Slight	Moderate: compressible; unstable fill.	Poor: low strength; shrink swell.	Poor: too clayey.	Floods; percs slowly.	Floods; percs slowly; wet.	Floods; percs slowly; wet.	Floods; percs slowly; wet.
Severe: depth to rock.	Severe: thin layer.	Poor: depth to rock.	Fair: too clayey.	Not needed	Droughty; slope.	Depth to rock	Depth to rock.
Moderate: seepage.	Moderate: piping.	Fair: low strength.	Fair: too clayey.	Not needed	Favorable	Favorable	Favorable.
Slight	Moderate: compressible.	Poor: low strength; shrink swell.	Fair: too clayey.	Not needed	Percs slowly	Percs slowly	Percs slowly.
Severe: seepage.	Severe: seepage.	Good	Poor: too sandy.	Cutbanks cave; floods.	Seepage	Erodes easily; too sandy.	Erodes easily.

Suitability is expressed as good, fair, and poor, which have, respectively, meanings approximately parallel to the terms slight, moderate, and severe.

Following are explanations of some of the columns in table 6.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and flooding. Slope is a soil property that affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. The lagoon has a nearly level floor. The sides, or embankments, are of compacted soil material. It is assumed that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic-matter content, and slope. If the floor needs to be leveled, depth to bedrock becomes important. Properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the number of stones, if any, that influence excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet; for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability,

TABLE 7.—*Engineering*

[Tests performed by Texas Highway

Soil name and location	Parent material	Report number	Depth	Soil shrinkage data			Mechanical analysis [1]		
				Shrinkage limit [2]	Lineal shrinkage	Shrinkage ratio	Percentage passing sieve—		
							3 inches	1¾ inches	1¼ inches
			Inches						
Ellen very gravelly loamy sand: From the intersection of U.S. Highways 87 and 77A in Cuero, 4.8 miles southeast on U.S. Highway 87; then 2.8 miles northeast on a county road; 0.9 miles southeast on a private road to a turnoff; then 0.4 mile south and southwest to a gravel pit entrance; and 400 feet southwest along pit excavation border. (Modal)	Ancient stream terrace or delta deposits of sand and gravel.	72–296–R	0–8	15	2.0	1.83	-------	100	98
		72–297–R	8–28	17	2.2	1.80	-------	100	97
		72–298–R	28–52	13	19.0	1.98	-------	-------	100
		72–299–R	52–76	12	17.4	1.95	-------	100	91
		72–300–R	76–84	15	18.0	1.90	-------	100	98
Sarnosa fine sandy loam: From the intersection of U.S. Highway 183 and Farm Road 766 in Cuero, 6.3 miles northwest on Farm Road 766 to an intersection with a county road; then 2.9 miles northwest on a paved county road to a hackberry tree on the right side of the road, and 50 feet southeast of the tree in rangeland. (Modal)	Calcareous loamy earth.	72–301–R	0–16	18	5.9	1.73	-------	-------	-------
		72–302–R	16–28	17	7.9	1.80	-------	-------	-------
		72–303–R	28–50	16	12.3	1.84	-------	-------	-------
		72–304–R	50–80	22	2.6	1.69	-------	-------	100
Shiner fine sandy loam: In rangeland, 13.6 miles northwest of Cuero on U.S. Highway 87 from its intersection with U.S. Highway 183 in Cuero to the intersection with a paved county road; then 0.4 mile east on a county road to the top of a hill; then 275 feet east on a county road; and 100 feet south of road fence. (Modal)	Calcareous loamy earth.	72–305–R	0–6	16	4.5	1.84	-------	-------	100
		72–306–R	6–16	18	4.3	1.79	-------	-------	100
		72–307–R	16–24	18	4.7	1.81	-------	-------	100
		72–308–R	24–60	18	2.7	1.81	-------	-------	100
		72–309–R	60–72	16	5.7	1.90	-------	-------	100
		72–310–R	72–82	16	7.4	1.87	-------	-------	100
Silvern very gravelly loamy sand: In rangeland, 6.8 miles southeast on U.S. Highway 87 from the intersection of U.S. Highways 87 and 183 in Cuero to its intersection with a county road; then 2.3 miles east and northeast on a county road to the crest of a small ridge, and 10 feet south of the road fence in the wall of a gravel pit.	Ancient terrace or delta deposits of sand and gravel.	72–273–R	0–10	16	1.7	1.81	-------	100	92
		72–274–R	10–22	12	1.5	2.00	97	95	79
		72–275–R	22–54	12	2.4	2.00	91	91	84
		72–276–R	54–62	16	6.4	1.85	94	94	83
		72–277–R	62–76	16	15.0	1.85	85	85	76
		72–278–R	76–100	16	12.6	1.84	-------	-------	100

test data

Department Laboratory, Austin]

Mechanical analysis [1]—Continued										Liquid limit [2]	Plasticity index [2]	Classification [3]	
Percentage passing sieve—Continued							Percentage smaller than—						
⅞ inch	⅝ inch	⅜ inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm			AASHTO [4]	Unified [5]
93	86	77	67	57	36	12	10	3	1	18	2	A-1-b(0)	SP-SM
89	78	67	54	41	22	8	6	2	1	20	3	A-1-a(0)	SP-SM
99	97	94	83	67	35	23	22	19	18	57	38	A-2-7(1)	SC
82	73	67	59	52	33	19	18	15	14	52	34	A-2-7(1)	SC
89	85	79	67	57	31	17	17	15	14	58	40	A-2-7(1)	SC
----	----	----	----	100	86	23	20	11	8	30	13	A-2-6(0)	SC
----	100	99	98	96	82	32	27	20	15	33	17	A-2-6(1)	SC
----	----	100	99	98	87	40	36	27	23	42	24	A-7-6(5)	SC
98	96	95	91	86	70	27	26	12	7	27	5	A-2-4(0)	SM-SC
98	96	95	91	86	75	23	20	12	8	24	7	A-2-4(0)	SM-SC
81	73	67	60	56	44	14	12	7	5	26	7	A-2-4(0)	SM-SC
96	96	94	89	84	61	25	24	14	8	27	9	A-2-4(0)	SC
99	99	99	98	97	84	22	19	10	6	22	3	A-2-4(0)	SM
97	97	97	96	96	94	60	58	32	15	26	13	A-6(6)	CL
99	99	97	95	93	91	62	56	28	16	30	15	A-6(7)	CL
86	77	58	37	28	23	8	7	1	0	18	3	A-1-a(0)	GP-GM
64	54	43	28	16	7	3	3	1	0	14	3	A-1-a(0)	GP
76	67	53	36	23	10	6	5	2	1	16	5	A-1-a(0)	GP-GM
77	66	54	41	33	21	14	13	11	9	28	14	A-2-6(0)	GC
62	48	42	35	30	19	13	12	11	10	50	32	A-2-7(0)	GC
98	92	87	78	71	39	22	22	19	19	43	25	A-2-7(1)	SC

TABLE 7.—*Engineering*

Soil name and location	Parent material	Report number	Depth	Soil shrinkage data			Mechanical analysis [1]		
				Shrinkage limit [2]	Lineal shrinkage	Shrinkage ratio	Percentage passing sieve—		
							3 inches	1¾ inches	1¼ inches
			Inches						
Tremona loamy fine sand:									
In rangeland, 4.4 miles southeast of Cuero on U.S. Highway 87 from its intersection with U.S. Highway 183; then 3.3 miles northeast on a county road to the second cattleguard in the road; then 1,000 feet northeast on the county road to a post-oak tree on the north edge of the road, and 50 feet north of road.	Interbedded clayey and loamy deposits.	72–291–R	0–12	15	1.2	1.79	--------	--------	--------
		72–292–R	12–28	13	1.3	1.84	--------	--------	100
		72–293–R	28–40	13	18.3	1.98	--------	--------	100
		72–294–R	40–58	13	18.0	1.97	--------	--------	--------
		72–295–R	58–68	13	15.8	1.92	--------	--------	--------
Weesatche sandy clay loam:									
In rangeland, 18 miles southwest of Cuero via U.S. Highway 87 and Texas Highway 72 to the intersection with Texas Highway 119 in Yorktown; then 4.8 miles south on Texas Highway 119 to county road; then 2.8 miles southwest and south along county road to an intersection; then 1,600 feet south along county road to the southeast corner of a field; then 205 feet south on the county road and 60 feet west of the fence.	Alkaline loamy sediments.	72–279–R	0–12	17	11.1	1.76	--------	--------	--------
		72–280–R	12–17	17	12.4	1.83	--------	--------	--------
		72–281–R	17–26	14	14.0	1.91	--------	--------	--------
		72–283–R	44–58	16	11.7	1.84	--------	--------	--------
		72–284–R	58–88	19	12.4	1.77	--------	--------	--------

[1] Mechanical analyses according to the AASHTO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

moderate resistance to sloughing, gentle slopes, and absence of rock outcrop or large stones. Suitable soils are not subject to flooding and do not have a high water table.

Dwellings without basements, as rated in table 6, are no more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect a soil for dwellings are those that relate to capacity to support load and resist settlement under load and to ease of excavation. Soil properties that affect capacity to support load are wetness, flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfill is a method of disposing of refuse in dug trenches. The waste is spread in thin layers and compacted and then covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 6 apply only to a depth of about 6 feet; therefore, a limitation rating of *slight* or *moderate* may not be valid if the trench is to be much deeper than 6 feet. For some soils, reliable predictions can be made to a depth of 10 or 15 feet. Nevertheless, every site should be investigated before it is selected.

Local roads and streets, as rated in table 6, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or

test data—Continued

Mechanical analysis [1]—Continued										Liquid limit [2]	Plasticity index [2]	Classification [3]	
Percentage passing sieve—Continued							Percentage smaller than—						
⅞ inch	⅝ inch	⅜ inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm			AASHTO [4]	Unified [5]
		100	98	97	80	19	13	2	0	17	3	A–2–4(0)	SM
98	96	94	90	86	69	18	13	2	1	15	1	A–2–4(0)	SM
98	97	94	92	89	77	45	43	36	35	55	39	A–7–6(9)	SC
	100	99	96	94	79	40	39	30	28	54	40	A–7–6(6)	SC
100	99	99	99	98	80	36	33	27	25	49	34	A–7–6(5)	SC
					92	46	38	16	11	41	23	A–7–6(6)	SC
					88	46	42	26	22	43	27	A–7–6(8)	SC
					77	41	38	26	23	43	28	A–7–6(6)	SC
	100	99	98	97	88	71	68	44	27	41	24	A–7–6(14)	CL
	100	99	99	98	96	86	82	44	25	47	28	A–7–6(17)	CL

[2] Procedures for laboratory tests may cause minor discrepancies in shrinkage limit, liquid limit, and the computed plasticity index.
[3] Unified and AASHTO Classification made by SCS personnel.
[4] Based on AASHTO Designation M 145–49 (*1*).
[5] Based on ASTM Standard D 2487–69 (*2*).

soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have provisions for drainage. They are built mainly from the soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load supporting capacity and stability of the subgrade and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic-supporting capacity. Wetness and flooding affect the stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and the amount of cut and fill needed to reach an even grade.

Pond reservoir areas hold water behind a dam or embankment. Suitable soils have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Stones or organic materials in a soil are among factors that are unfavorable.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

The soils in the county are not good sources of sand and gravel. Ellen, Garcitas, Lupe, Silvern, and Valco

soils, and Tremona gravelly loamy sand are fair sources of gravel.

Topsoil is used in topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, such as in preparing a seedbed; natural fertility of the material or the response of plants when fertilizer is applied and absence of substances toxic to plants. The texture of the soil material and the content of stone fragments also affect suitability. Also considered in the ratings is damage that will result at the area from which topsoil is taken.

Drainage of cropland and pasture is affected by such soil properties as permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope and stability in ditchbanks; stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; stream overflow, water erosion, or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in a fragipan or other layer that restricts movement of water; amount of water held available to plants; need for drainage; and depth to water table or bedrock.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect the suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Waterways are either natural or man-shaped, grass-seeded channels that carry runoff at nonerosive velocities to outlets. The suitability of a soil for grassed waterways is determined by the erosion hazard and the amount of shaping that can be done. It depends on the slope, the number of stones, the depth to rock, and the difficulty in establishing vegetation.

Soil test data

Table 7 contains engineering test data for some of the major soils in De Witt County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications are based on data obtained by mechanical analyses and by tests to determine liquid limit and plastic limit. The mechanical analyses were made by combined sieve and hydrometer methods.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material.

Shrinkage limit is the moisture content at which shrinkage of the soil material stops.

Linear shrinkage is the decrease in one dimension, expressed as a percentage of the original dimension, of the soil mass when the moisture content is reduced from the given value to the shrinkage limit.

Shrinkage ratio is the relation of the change in volume of the soil material to the water content of the soil material when at the shrinkage limit. The change in volume is expressed as a percentage of the air-dry volume of the soil material, and the water content is expressed as a percentage of the weight of the soil material when ovendry.

Formation and Classification of the Soils

This section explains the factors of soil formation as they relate to the soils in De Witt County and briefly describes important processes in the differentiation of soil horizons. It also explains the current system of soil classification and classifies each soil series represented in the county according to that system.

Factors of Soil Formation

Soil is the product of the interaction of the five major factors of soil formation. They are climate; living organisms, especially vegetation; parent material; relief, or topography; and time. The relative importance of each factor differs from place to place, and each modifies the effects of the other four. In some cases, one factor may dominate in the formation of a soil.

Climate

Precipitation, temperature, and wind have been important in the formation of the soils of De Witt County. The wet climate of past geologic ages influenced the deposition of parent material. Later rainfall was variable and influenced differences in soil formation. Mature soils, such as Catilla, Crockett and Goldmire soils, have been leached of their carbonates and salts, and some have had a reduction and transfer of iron. In part of the county the rainfall has been great enough to leach the carbonates from the upper horizons of some soils, but not great enough to leach it entirely from the soils. Cuero, Papalote, and Runge soils, for example, have a layer of calcium carbonate below the root zone. Many of the younger soils, such as the Buchel, Leemont, and Sarnosa soils, have free lime throughout the profiles.

The mild temperatures in the county influenced the kinds and growth of organisms in and on the soil. Also, the temperature changes, though not too great from season to season, have somewhat affected the weathering process and chemical reaction in the soils.

Wind has affected the formation of some soils in this county. The Nueces and Sarita soils formed in eolian deposits and were later affected by shifting sands.

Living organisms

Vegetation, micro-organisms, earthworms, and other forms of life that live on and in the soil contribute to soil formation. They add to the supply of organic matter and nitrogen in the soils, contribute to changes in the structure and porosity of the soils, and bring about changes in the amount of plant nutrients.

Plants, mainly mid and tall grasses and hardwoods, have affected soil formation more than other organisms. They contributed to the accumulation of organic material. Because of the decaying grass leaves and

stems and roots, prairie soils are darker colored and have a higher content of organic matter than soils formed under hardwoods. For example, Runge and Heiden soils formed under grass and have a medium to high content of organic matter. In contrast, Ellen, Leming, Silvern, Straber, and Tremona soils formed under hardwoods and have a low content of organic matter.

Earthworms are the most conspicuous form of animal life in the soil. Despite the low rainfall in the area and the periods when the soil is completely dry, earthworms have had an important part in soil formation. Worm casts, which are found in such soils as the Mabank, Meguin, Sarnosa, and Shiner soils, help to facilitate the movement of air, roots, and water in the soil.

The influence of man on the soil-forming factors must also be considered. At first, he fenced the range, stocked it, and permitted it to be overgrazed. Then he plowed the land and planted crops. By poorly timed tillage and the use of heavy machinery, he compacted the soil and in some areas reduced aeration and infiltration of water. By harvesting the crops, exposing the bare soil to the elements, and allowing erosion from runoff and soil blowing, he reduced the amount of organic matter and the proportion of silt and clay particles in the plow layer. In some areas, he changed the moisture regime by irrigating. These activities, most of which have taken place within the last 75 years, have had a marked effect on the soils of the county.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It determines the limits of the chemical and mineral composition of the soil. The soils of De Witt County formed in different kinds of material. The rocks are of sedimentary origin deposited by water and are primarily a series of alternating strata of sand, silt and clay.

Sarnosa, Shiner, and Monteola soils, for example, formed in sand or sandstone mixed with clay or marl and shell or gravel.

Crockett, Wilson, Denhawken, Elmendorf, Heiden, and Mabank soils formed mostly in clay, sandy clay, sand, and interbedded sandstone, clay, gravel, and conglomerate.

Weesatche, Papalote, and Leming soils formed mostly in sand and sandstone interbedded with some clay, caliche, and gravel.

Tremona, Fordtran, Silvern, and Ellen soils formed in lenses of gravel and layers of clay and silt.

Sinton, Degola, Trinity, and Zalla soils formed in clay, silt, sand, and gravel alluvial plains of major streams.

Relief

Relief influences soil formation through its effect on drainage, runoff, erosion, plant cover, and soil temperature. In most of De Witt County the soils are nearly level to gently sloping, but in small areas they have steeper slopes.

On the steeper slopes where runoff is rapid, the soil material is likely to be removed by erosion almost as fast as horizons form. Shiner soils, for example, formed in stronger sloping areas than Cuero soils; thus, they are thinner and the horizons are not so well defined.

Buchel, Fordtran, and Papalote soils formed in nearly level to gently sloping areas where much of the rainfall was absorbed. Rainfall causes leaching and affects other soil-forming processes that aid in the formation of distinct soil horizons.

Soils in depressions or concave areas receive runoff from the higher lying soils. They stay wet for longer periods and tend to accumulate more sediment from floods and overflow. The level or nearly level Degola, Sinton, and Trinity soils receive extra water from runoff or flooding.

Time

The length of time that climate, living organisms, and relief have acted on parent material affects the kind of soil that forms, but the effects of time are modified by the other four factors of soil formation. Soils that do not have clearly expressed horizons are considered young or immature. Soils that have well expressed horizons are considered old or mature.

Soils formed in recent alluvium, such as Sinton and Zalla soils, are immature because the alluvium has not been in place long enough for a well expressed profile to form. The steeper Shiner and Valco soils are immature because geologic erosion has removed soil material as it forms. Old or mature soils, such as Crockett, Miguel, Papalote, Weesatche, and Sarita soils, show marked horizon differentiation. Most of the mature soils in the county are well drained to moderately well drained and nearly level to gently sloping and have been in place for a long time.

Processes of Horizon Differentiation

Several processes have been involved in the differentiation of soil horizons in De Witt County. Among these are accumulation of organic matter; leaching of calcium carbonate and salts; reduction and transfer of iron; and formation and translocation of silicate clay minerals. In most soils more than one of the above processes have been active in the formation of soil horizons.

Accumulation of organic matter in the upper part of the soil profile has been important in the formation of an A1 horizon. The soils of De Witt County contain no more than a moderate amount of organic matter. Nueces, Sarita, Leming, and other soils that have a sandy surface layer have a small amount of organic matter. Branyon, Houston Black, Elmendorf, and Runge soils have a fairly large amount. In eroded areas the soils normally have only a small amount of organic matter.

Much leaching of carbonates and salts has occurred in Catilla, Crockett, and Goldmire soils. Some leaching has occurred in Miguel, Runge, Papalote, and Leming soils. The upper horizons of these soils are free of lime, but there is an accumulation of calcium carbonate below the rooting zones. Other soils, such as Elmendorf and Cuero soils, are only slightly leached. Carbonates occur in the horizons below the loamy surface layer. Not enough time has passed for removal of carbonates.

Reduction and transfer of iron, a process called gleying, is evident in some of the poorly drained soils of

the county. The gray color in the subsoil indicates a reduction and loss of iron. The mottles and concretions in some horizons indicate a segregation of the iron. Fordtran, Garcitas, Orelia, and Tremona soils are examples of somewhat poorly drained soils that are mottled in the lower horizons.

Translocation of clay minerals is evident in Crockett, Miguel, Papalote, Runge, and Elmendorf soils. The B horizon has accumulated clay in the form of clay films in the pores and on the surfaces of peds. These soils were probably leached of carbonates and soluble salts before translocation of silicate clays took place.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils are grouped according to similar genesis, or mode of origin. In table 8, the soil series of De Witt County are classified in three categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized. The properties used to differentiate among the soil orders are those that tend to give broad climatic groupings of

TABLE 8.—*Classification of soil series*

Series	Family	Subgroup	Order
Branyon	Fine, montmorillonitic, thermic	Udic Pellusterts	Vertisols.
Buchel	Fine, montmorillonitic, hyperthermic	Udic Pellusterts	Vertisols.
Catilla	Loamy, siliceous, thermic	Grossarenic Paleustalfs	Alfisols.
Crockett	Fine, montmorillonitic, thermic	Udertic Paleustalfs	Alfisols.
Cuero	Fine-loamy, mixed, thermic	Pachic Argiustolls	Mollisols.
Degola	Fine-loamy, mixed, hyperthermic	Cumulic Haplustolls	Mollisols.
Denhawken	Fine, montmorillonitic, hyperthermic	Vertic Ustochrepts	Inceptisols.
Edna	Fine, montmorillonitic, thermic	Vertic Albaqualfs	Alfisols.
Ellen	Loamy-skeletal, siliceous, thermic	Aquic Arenic Paleustalfs	Alfisols.
Elmendorf	Fine, montmorillonitic, hyperthermic	Vertic Argiustolls	Mollisols.
Ferris	Fine, montmorillonitic, thermic	Udorthentic Chromusterts	Vertisols.
Fordtran	Clayey, mixed, hyperthermic	Arenic Albaqualfs	Alfisols.
Garcitas	Clayey, mixed, hyperthermic	Aquic Arenic Paleustalfs	Alfisols.
Goldmire	Loamy-skeletal, siliceous, thermic	Aquic Paleustalfs	Alfisols.
Heiden	Fine, montmorillonitic, thermic	Udic Chromusterts	Vertisols.
Houston Black	Fine, montmorillonitic, thermic	Udic Pellusterts	Vertisols.
Leemont	Fine, montmorillonitic, hyperthermic	Entic Pellusterts	Vertisols.
Leming	Clayey, mixed, hyperthermic	Aquic Arenic Paleustalfs	Alfisols.
Lupe	Loamy-skeletal, mixed, hyperthermic	Typic Calciustolls	Mollisols.
Mabank	Fine, montmorillonitic, thermic	Vertic Albaqualfs	Alfisols.
Meguin	Fine-silty, mixed, hyperthermic	Fluventic Haplustolls	Mollisols.
Miguel	Fine, mixed, hyperthermic	Udic Paleustalfs	Alfisols.
Monteola	Fine, montmorillonitic, hyperthermic	Typic Pellusterts	Vertisols.
Nueces	Loamy, mixed, hyperthermic	Aquic Arenic Paleustalfs	Alfisols.
Orelia	Fine-loamy, mixed, hyperthermic	Typic Ochraqualfs	Alfisols.
Papalote	Fine, mixed, hyperthermic	Aquic Paleustalfs	Alfisols.
Runge	Fine-loamy, mixed, hyperthermic	Typic Argiustolls	Mollisols.
Sarita	Loamy, mixed, hyperthermic	Grossarenic Paleustalfs	Alfisols.
Sarnosa	Coarse-loamy, mixed, hyperthermic	Typic Calciustolls	Mollisols.
Shiner	Loamy, carbonatic, hyperthermic, shallow	Typic Ustochrepts	Inceptisols.
Silvern	Loamy-skeletal, siliceous, thermic	Grossarenic Paleustalfs	Alfisols.
Sinton	Fine-loamy, mixed, hyperthermic	Cumulic Haplustolls	Mollisols.
Straber	Fine, mixed, thermic	Aquic Paleustalfs	Alfisols.
Tremona	Clayey, mixed, thermic	Aquic Arenic Paleustalfs	Alfisols.
Trinity	Fine, montmorillonitic (calcareous), thermic	Vertic Haplaquolls	Mollisols.
Valco	Loamy, mixed, hyperthermic, shallow	Petrocalcic Calciustolls	Mollisols.
Weesatche	Fine-loamy, mixed, hyperthermic	Typic Argiustolls	Mollisols.
Wilson	Fine, montmorillonitic, thermic	Vertic Ochraqualfs	Alfisols.
Zalla	Sandy, mixed, hyperthermic	Typic Ustifluvents	Entisols.

soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is identified by a word of three or four syllables ending in *sol* (Ent-i-sol).

The five orders to which the soils of De Witt County belong are Alfisols, Entisols, Inceptisols, Mollisols, and Vertisols. Alfisols have a light colored surface layer low in organic-matter content, a clay-enriched B horizon, an accumulation of aluminum and iron, and a base saturation of more than 35 percent. Entisols have little or no evidence of development of pedogenic horizons. Inceptisols have a light colored surface layer low in organic-matter content, but lack a clay-enriched B horizon. Mollisols have a dark colored surface layer high in organic-matter content and have a base saturation of more than 50 percent. Vertisols are clayey soils that have deep, wide cracks part of each year in most years.

SUBORDER.—Each order is divided into suborders based primarily on those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The names of suborders have two syllables, the last of which indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* from Entisol).

GREAT GROUP.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons considered are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark red and dark brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquents (*Hapl,* meaning simple horizons, *aqu* for wetness or water, and *ent,* from Entisols).

SUBGROUP.—Each great group is divided into subgroups, one representing the central (typic) segment of the group and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haplaquents (a typical Haplaquent).

FAMILY.—Families are established within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names, as shown in table 8, for texture, mineralogy, and so on, that are used as family differentiae. An example is the coarse-loamy, siliceous, acid, thermic family of Typic Haplaquents.

General Nature of the County

De Witt County was created and organized in 1846 from Goliad, Gonzales, and Victoria Counties. It was named for Green De Witt, who established a settlement in 1825 in the vicinity of the Guadalupe River and also established the city of Gonzales.

The economy of De Witt County depends chiefly on livestock, farming, and small industry. Hogs and beef cattle and dairying are important livestock enterprises. Sheep and goats are of less importance. The county is widely known for the large production of turkeys and other poultry.

Among the industries in the county are cottonseed oil mills, textile mills, beef processing plants, and factories for canning and for manufacturing leather goods. The most important mineral resources are oil and gas. There are a few sand and gravel pits.

On the pages that follow are facts about the climate, geology, topography, and drainage of the county.

Climate [4]

The climate of De Witt County is humid subtropical. Summers are hot. Rainfall averages 33.17 inches annually and is heaviest in May and September. In most years, March is the driest month. A summary of the climate for De Witt County is shown in table 9.

The climate of the county is characterized by a considerable range in annual extremes of temperature; however, air masses of continental origin play a minor role in determining the weather in the area. The prevailing winds are southeasterly throughout the spring, summer, and fall, and tropical air masses from the Gulf of Mexico are dominant during these seasons. Polar air masses, greatly modified by a long trajectory across southern latitudes and by the warmer water surface of the Gulf of Mexico, result in mild winter temperatures.

Rainfall, commonly in the form of thundershowers, may vary considerably from month to month and from year to year. In 1914, the wettest year recorded at Cuero, 10.39 inches of rain fell in May, 11.76 inches in August, and 14.92 inches in October, to boost the yearly total to 59.13 inches. Only 12.83 inches fell in 1917, the driest year of record.

Annually, De Witt County receives about 62 percent of the total possible sunshine. Seasonally, sunshine varies from about 49 percent in winter to 74 percent in summer. The mean relative humidity, at noon, is estimated at 63 percent in January, 62 percent in April, 53 percent in July and 54 percent in October.

Winter alternates mild, sunny, less humid days with cool, cloudy, drizzly days. The temperature drops to 32°F or below about 25 days each year, but generally these freezing temperatures are confined to a few hours

[4] By ROBERT B. ORTON, State climatologist, Environmental Sciences Service Administration.

TABLE 9.—*Temperature*

[Based on records kept during a 16- to

Month	Temperature							Mean degree days [2]
	Means [1]			Extremes [1]				
	Daily maximum	Daily minimum	Monthly	Record high	Year	Record low	Year	
	°F	°F	°F	°F		°F		
January	64.3	39.7	52.0	88	1971	2	1949	443
February	68.0	44.2	56.1	92	1954	3	1949	300
March	74.6	49.5	62.1	98	1971	22	1943	182
April	81.8	59.1	70.5	99	1963	32	1971	27
May	87.9	65.9	76.9	100	[3] 1967	43	1954	1
June	93.7	71.0	82.4	104	[3] 1963	55	1964	0
July	97.1	72.4	84.8	110	1954	63	1970	0
August	97.7	71.9	84.8	109	1954	60	[3] 1967	0
September	92.1	67.8	80.0	108	1954	42	1942	(4)
October	85.1	58.0	71.6	99	[3] 1956	29	1955	29
November	74.9	48.5	61.7	94	1947	23	[3] 1970	163
December	67.5	41.0	54.3	90	1951	13	1950	332
Year	82.1	57.4	69.8	110	July 1954	2	Jan. 1949	1477

[1] Period of record 1942–71.
[2] Based on a temperature of 65° F.
[3] Trace.

just before sunrise. The lowest temperature recorded at Cuero was 2°, on January 31, 1949.

Summers are commonly hot and humid with little change in the day-to-day weather, especially during midsummer. Refrigerated air conditioning is recommended for maximum comfort indoors and while traveling. The highest temperature recorded at Cuero was 110° on July 27, 1954.

Spring and fall are ideal seasons. Temperatures are moderate, and the weather has greater variety than in summer. Considerable morning cloudiness is present early in spring. Tropical storms that occasionally visit the Texas coast late in summer and early in fall may bring heavy rains to the area, but this is an infrequent occurrence. October and November are ideal with long periods of clear days of mild temperatures and cool nights.

The warm season, or freeze-free period, is 270 days. The mean dates of the last occurrence of 32° or below in the spring and the first occurrence of 32° or below in the fall are March 3 and November 29, respectively. The mean annual lake, or free water, evaporation is 55 inches, and in an average year, evaporation exceeds precipitation by 24 inches.

Geology [5]

The geologic formations in De Witt County range in age from Miocene to Recent and are chiefly sand, sandstone, gravel, and clay. Except for the alluvium along the Guadalupe River and its tributaries, the outcrops of geologic formations lie in more or less parallel bands that trend roughly northeasterly. The older stratigraphic units are exposed near the northwestern limits of the county. Younger bedrock units are exposed in sequence in a generally southeastward direction.

Strata of the Tertiary System are represented by the Catahoula Tuff, Oakville Sandstone, and Lagarto Clay Formations of Miocene age and the Goliad Sand Formation of Pliocene age.

The Catahoula Tuff Formation crops out in small areas in the vicinity of Hochheim and Westhoff. It is about 60 percent ash or tuff, 20 to 30 percent sandstone, 10 to 20 percent clay, and minor amounts of conglomerate. Sarnosa and Shiner soils are common in this outcrop area.

The Oakville Sandstone Formation crops out in a belt about 8 miles wide extending northeastwardly across the county. It is about 40 percent sand or sandstone, 30 percent sandy and bentonitic clay, 20 percent marl, 5 percent redeposited cretaceous shells, and 5 percent gravel. The Oakville Sandstone, one of the principal aquifers in De Witt County, supplies small to large quantities of water, chiefly for municipal and irrigation uses. Among the soils formed over strata of the Oakville Sandstone are Sarnosa, Shiner, and Monteola soils.

The Lagarto Clay Formation crops out in an irregular belt extending northeastwardly across the central part of the county. It is clay, sandy clay, and interbedded clay, sandstone, gravel, and conglomerate. The Lagarto Clay is similar in lithologic character to the underlying Oakville Sandstone, but it has more clay, the sand is finer grained, and the beds of sand are less

[5] WENDELL F. SMITH, field specialist, Soil Conservation Service, prepared this section.

and precipitation

30-year period at Station Cuero, Texas]

Precipitation								Mean number of days with—				
Mean	Greatest daily	Year	Snow and sleet					Precipitation of 0.10 inch or more	Maximum temperature of—		Minimum temperature of—	
			Mean	Maximum monthly	Year	Greatest depth	Year		90° F or higher	32° F or lower	0° to 32° F	0° F or lower
Inches	*Inches*		*Inches*	*Inches*		*Inches*						
2.03	2.12	1965	0.2	2.9	1949	(3)	1962	4	0	(4)	10	0
2.41	2.80	1958	.3	6.5	1960	----------	----------	4	0	(4)	5	0
1.41	2.40	1943	(3)	(3)	1962	0	----------	3	1	0	2	0
2.95	3.73	[5] 1969	0	0	----------	0	----------	4	2	0	(4)	0
3.79	3.70	1947	0	0	----------	0	----------	5	13	0	0	0
3.18	3.52	1966	0	0	----------	0	----------	4	26	0	0	0
2.22	3.10	1942	0	0	----------	0	----------	3	30	0	0	0
2.75	4.41	1946	0	0	----------	0	----------	3	29	0	0	0
4.69	10.90	1967	0	0	----------	0	----------	6	20	0	0	0
3.27	5.19	1960	0	0	----------	0	----------	4	8	0	0	0
2.35	2.90	1961	0	0	----------	0	----------	4	(4)	0	2	0
2.12	1.62	1945	(3)	(3)	[5] 1964	0	----------	4	0	0	6	0
33.17	10.90	Sept. 1967	.5	6.5	Feb. 1960	----------	----------	48	129	(4)	25	0

[4] Less than half a day.
[5] Also on earlier dates, months, or years.

massive. Such soils as the Heiden, Wilson, Crockett, and Mabank soils are typical within this outcrop.

The Goliad Sand Formation crops out in the southern and southeastern parts of the county. The widest part of the outcrop occurs in the southeast corner where it is 6 miles wide. This formation is dominantly sand and sandstone interbedded with clay and gravel. Pink clay and caliche are characteristic. Papalote, Weesatche, and Leming are examples of soils formed on strata of this formation.

Rocks of the Quaternary System are represented by the Lissie Formation of Pleistocene age and alluvial deposits of Recent age.

The Lissie Formation crops out in three areas in the county: a triangular-shaped area about 6 miles northeast of Cuero, a narrow strip along the De Witt-Lavaca county line approximately 5 to 10 miles southeast of Yoakum, and along the De Witt-Victoria county line northeast of Thomaston. This formation is sand that has lenses of gravel and layers of clay and silt. This material has weathered to form such soils as the Silvern, Ellen, Tremona, and Fordtran soils.

Alluvial deposits, consisting of clay, silt, sand and gravel, occur along the Guadalupe River and several of the larger streams in the county. Examples of soils formed in this material are the Sinton, Trinity, Degola, and Zalla soils.

Topography and Drainage

De Witt County is nearly level to sloping, and a small part of the eastern corner is almost flat. The areas of greatest relief are mostly along the northwest county line. Elevation ranges from slightly less than 150 feet above sea level at the east corner to more than 540 feet above sea level about one-half mile east of the Gonzales, Karnes, and De Witt county line.

Most of the county is drained by the Guadalupe River. Small areas in the northern part of the county are drained by the Lavaca River basin, and a small area in the southern part is drained by the San Antonio River basin. The Guadalupe River is a perennial stream that is fed by large springs at New Braunfels and San Marcos. These springs help to maintain low flow of the river in De Witt County during periods of drought.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere, but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali soil. Generally, a highly alkaline soil. Specifically, an alkali soil has so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that the growth of most crop plants is low from this cause.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where its gradient lessens abruptly.

Alluvium. Soil material, such as sand, silt or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bench terrace. A shelflike embankment of earth that has a level or nearly level top and a steep or nearly vertical downhill face, constructed along the contour of sloping land or across the slope to control runoff and erosion. The downhill face of the bench may be made of rocks or masonry, or it may be planted to vegetation.

Broad-base terrace. A ridge-type terrace 10 to 20 inches high and 15 to 30 feet wide that has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. This kind of terrace controls erosion by diverting runoff along the contour at a nonscouring velocity. It may be nearly level or have a grade toward one or both ends.

Buried soil. A developed soil, once exposed but now overlain by more recently formed soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm temperate areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clean tillage. Cultivation to prevent the growth of all vegetation except the particular crop desired.

Cobblestone. A rounded or partly rounded fragment of rock, 3 to 10 inches in diameter.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Conglomerate. Rock composed of gravel and rounded stones cemented together by hardened clay, lime, iron oxide, or silica.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Control section. That part of the soil upon which the classification of the soil is based.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low available water capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Emergency tillage. Cultivation by listing, ridging, duckfooting, chiseling, pitting, basin listing, or other means to roughen the soil surface for temporary control of wind erosion.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Gilgai. Typically, the microrelief of Vertisols—clayey soils that have a high coefficient of expansion and contraction with changes in moisture; usually a succession of microbasins and microknolls, in nearly level areas, or of microvalleys and microridges that run with the slope.

Granule. A single mass, or cluster, of many individual soil particles.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a

mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Microrelief. Minor surface configurations of the land.

Mineral soil. Soil composed mainly of inorganic (mineral) material and low in content of organic material. Its bulk density is greater than that of organic soil.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Mulch tillage. Tillage or preparation of the soil in such a way that plant residue is left on the surface.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut, but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Plowpan. A compacted layer formed in the soil immediately below the plowed layer.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; or contains harmful salts and has a highly alkaline reaction; or contains harmful salts and exchangeable sodium and is strongly alkaline in reaction. The salts, exchangeable sodium, and alkaline reaction occur in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Shrink-swell potential (engineering). Amount that a soil will expand when wet or contract when dry. Indicates kinds of clay in soil.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Slickspots. Small areas in a field that are slick when wet because they contain excess exchangeable sodium, or alkali.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter; *silt* (0.05 to 0.002 millimeter; and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stones. Rock fragments greater than 10 inches in diameter if rounded, and greater than 15 inches along the longer axis if flat.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic;* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Water table, perched. The upper surface of a body of free ground water that is separated from an underlying body of ground water by unsaturated material.

GUIDE TO MAPPING UNITS

Map symbol	Mapping unit	Page	Capability unit Symbol	Page	Pasture and hay group Symbol	Range site Name	Page
BrA	Branyon clay, 0 to 1 percent slopes	6	IIw-3	38	7A	Blackland	44
Bu	Buchel clay, occasionally flooded	7	IIw-3	38	7A	Clayey Bottomland	45
CaC	Catilla fine sand, 0 to 5 percent slopes	8	IIIe-9	39	9B	Deep Sand Savannah	46
CrA	Crockett fine sandy loam, 0 to 1 percent slopes	8	IIIs-2	39	8A	Claypan Prairie (BL)1/	45
CrB	Crockett fine sandy loam, 1 to 3 percent slopes	8	IIIe-1	38	8A	Claypan Prairie (BL)1/	45
CrC	Crockett fine sandy loam, 3 to 5 percent slopes	9	IVe-1	39	8A	Claypan Prairie (BL)1/	45
CsC2	Crockett soils, 2 to 5 percent slopes, eroded	9	IVe-5	40	8A	Claypan Prairie (BL)1/	45
CuB	Cuero sandy clay loam, 0 to 2 percent slopes	9	IIe-4	37	7C	Clay Loam	44
De	Degola clay loam, occasionally flooded	10	IIw-2	38	1C	Loamy Bottomland	47
Dg	Degola soils, frequently flooded	10	Vw-1	40	1C	Loamy Bottomland	47
DuB	Denhawken-Elmendorf complex, 0 to 3 percent slopes	11	IIIe-4	38	7A	Blackland	44
EdA	Edna fine sandy loam, 0 to 1 percent slopes	11	IIIw-1	39	8A	Claypan Prairie (CO)2/	45
FeC2	Ferris soils, 3 to 5 percent slopes, eroded	13	IVe-2	39	7A	Eroded Blackland	46
FoA	Fordtran loamy fine sand, 0 to 1 percent slopes	14	IIIw-2	39	9A	Sandy Prairie	47
GaB	Garcitas gravelly loamy fine sand, 0 to 3 percent slopes	14	IVs-2	40	9A	Sandy Prairie	47
GdD	Goldmire very gravelly soils, 1 to 8 percent slopes	15	VIs-2	40	------	Gravelly	46
HeB	Heiden clay, 1 to 3 percent slopes	16	IIe-1	37	7A	Blackland	44
HeC	Heiden clay, 3 to 5 percent slopes	16	IIIe-2	38	7A	Blackland	44
HoA	Houston Black clay, 0 to 1 percent slopes	16	IIw-3	38	7A	Blackland	44
HoB	Houston Black clay, 1 to 3 percent slopes	17	IIe-1	37	7A	Blackland	44
LeC	Leemont clay, 3 to 5 percent slopes	17	IIIe-3	38	7A	Blackland	44
LeD	Leemont clay, 5 to 8 percent slopes	17	IVe-2	39	7B	Blackland	44
LmC	Leming loamy fine sand, 0 to 5 percent slopes	18	IIIe-9	39	9A	Loamy Sand	47
LuD	Lupe gravelly sandy clay loam, 1 to 8 percent slopes	19	VIs-2	40	8C	Gravelly Loam	46
MaA	Mabank fine sandy loam, 0 to 1 percent slopes	20	IIIw-1	39	8A	Claypan Prairie (BL)1/	45
MaB	Mabank fine sandy loam, 1 to 3 percent slopes	20	IIIe-1	38	8A	Claypan Prairie (BL)1/	45
Me	Meguin silty clay loam, occasionally flooded	20	IIw-2	38	1C	Loamy Bottomland	47
Mf	Meguin soils, frequently flooded	20	Vw-1	40	1C	Loamy Bottomland	47
MgC	Miguel fine sandy loam, 3 to 5 percent slopes	22	IVe-3	39	8A	Tight Sandy Loam	48
MgC2	Miguel fine sandy loam, 3 to 5 percent slopes, eroded	22	IVe-3	39	8A	Tight Sandy loam	48
MoA	Monteola clay, 0 to 1 percent slopes	23	IIs-1	38	7A	Blackland	44
MoB	Monteola clay, 1 to 3 percent slopes	23	IIIe-2	38	7A	Blackland	44
Na	Natraqualfs	23	VIs-1	40	------	Salty	48
NsC	Nueces-Sarita complex, 0 to 5 percent slopes	24	IIIe-5	38	9A	Deep Sand	45
OrB	Orelia fine sandy loam, 0 to 2 percent slopes	24	IIIw-1	39	8A	Claypan Prairie (RG)3/	45
PaA	Papalote fine sandy loam, 0 to 1 percent slopes	25	IIs-2	38	8A	Tight Sandy Loam	48
PaB	Papalote fine sandy loam, 1 to 3 percent slopes	25	IIe-2	37	8A	Tight Sandy Loam	48

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit		Pasture and hay group	Range site	
			Symbol	Page	Symbol	Name	Page
RuA	Runge fine sandy loam, 0 to 1 percent slopes	26	IIc-1	38	8C	Sandy Loam	47
RuB	Runge fine sandy loam, 1 to 3 percent slopes	26	IIe-3	37	8C	Sandy Loam	47
RuC	Runge fine sandy loam, 3 to 5 percent slopes	26	IIIe-8	38	8C	Sandy Loam	47
SaA	Sarnosa fine sandy loam, 0 to 1 percent slopes	28	IIc-1	38	8C	Gray Sandy Loam	46
SaB	Sarnosa fine sandy loam, 1 to 3 percent slopes	28	IIe-3	37	8C	Gray Sandy Loam	46
SaC	Sarnosa fine sandy loam, 3 to 5 percent slopes	28	IIIe-8	38	8C	Gray Sandy Loam	46
SaD	Sarnosa fine sandy loam, 5 to 8 percent slopes	28	IVe-7	40	8C	Gray Sandy Loam	46
SbC2	Sarnosa soils, 3 to 5 percent slopes, eroded	28	IVe-6	40	8C	Gray Sandy Loam	46
ShC	Shiner fine sandy loam, 1 to 5 percent slopes	29	IVe-4	39	14A	Chalky Ridge	44
ShD	Shiner fine sandy loam, 5 to 8 percent slopes	29	VIe-1	40	14A	Chalky Ridge	44
SkD	Silvern-Ellen complex, 1 to 8 percent slopes	30	VIs-2	40	------	Gravelly	46
Sn	Sinton loam	31	IIw-2	38	2A	Loamy Bottomland	47
StA	Straber loamy fine sand, 0 to 1 percent slopes	32	IIIs-1	39	9A	Sandy	47
StC	Straber loamy fine sand, 1 to 5 percent slopes	32	IIIe-1	38	9A	Sandy	47
TeC	Tremona loamy fine sand, 0 to 5 percent slopes	33	IIIe-6	38	9A	Sandy	47
TgC	Tremona gravelly loamy sand, 1 to 5 percent slopes	33	IVs-2	40	9A	Gravelly	46
To	Trinity clay, occasionally flooded	33	IIw-1	37	1A	Clayey Bottomland	45
Tr	Trinity clay, frequently flooded	33	Vw-1	40	1A	Clayey Bottomland	45
VaD	Valco sandy clay loam, 1 to 8 percent slopes	34	IVs-1	40	13A	Shallow	48
WeB	Weesatche sandy clay loam, 1 to 3 percent slopes	34	IIe-3	37	7C	Clay Loam	44
WeC	Weesatche sandy clay loam, 3 to 5 percent slopes	35	IIIe-7	38	7C	Clay Loam	44
WsA	Wilson clay loam, 0 to 1 percent slopes	35	IIIw-3	39	7H	Claypan Prairie (BL)1/	45
WsB	Wilson clay loam, 1 to 3 percent slopes	35	IIIe-10	39	7H	Claypan Prairie (BL)1/	45
Za	Zalla fine sand, occasionally flooded	36	IVw-1	40	3A	Loamy Bottomland	47

1/ BL refers to Texas Blackland Prairie land resource area.

2/ CO refers to Gulf Coast Prairie land resource area.

3/ RG refers to Rio Grande Plain land resource area.

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SOIL ASSOCIATIONS *

DEEP LOAMY AND SANDY AND GRAVELLY AND VERY GRAVELLY SANDY SOILS OF THE UPLANDS.

1 LEMING–PAPALOTE association: Nearly level to gently sloping, moderately well drained, slowly permeable, noncalcareous sandy and loamy soils.

2 TREMONA association: Nearly level to gently sloping, somewhat poorly drained, very slowly permeable, noncalcareous sandy soils.

3 SILVERN–ELLEN association: Gently sloping to sloping, well drained and moderately well drained, moderately and moderately slowly permeable, noncalcareous gravelly and very gravelly sandy soils.

4 FORDTRAN association: Nearly level, very slowly permeable, somewhat poorly drained, noncalcareous sandy soils.

DEEP AND SHALLOW LOAMY SOILS OF THE UPLANDS.

5 SARNOSA–SHINER association: Nearly level to sloping, well drained, moderately permeable, calcareous loamy soils.

DEEP LOAMY AND CLAYEY SOILS OF THE UPLANDS.

6 CROCKETT–MABANK association: Nearly level to gently sloping, moderately well drained and somewhat poorly drained, very slowly permeable, noncalcareous loamy soils.

7 SARNOSA–MONTEOLA association: Nearly level to sloping, well drained and moderately well drained, moderately and very slowly permeable, calcareous loamy and clayey soils.

8 WEESATCHE–PAPALOTE association: Nearly level to gently sloping, well drained and moderately well drained, moderately and slowly permeable, noncalcareous loamy soils.

9 HEIDEN–HOUSTON BLACK association: Nearly level to gently sloping, very slowly permeable, well drained and moderately well drained, calcareous clayey soils.

DEEP LOAMY AND CLAYEY SOILS OF THE BOTTOM LAND.

10 MEGUIN–TRINITY association: Nearly level, moderately and very slowly permeable, well drained and somewhat poorly drained, calcareous loamy and clayey soils.

* Unless otherwise stated, texture refers to the surface layer of the major soils in each association.

Compiled 1977

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEXAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
DE WITT COUNTY, TEXAS

Scale 1:253,440
1 0 1 2 3 4 Miles

N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS
DE WITT COUNTY, TEXAS

Scale 1:253,440

1 0 1 2 3 4 Miles

N

Inset, sheet 4
Inset, sheet 20
Inset, sheet 5
Inset, sheet 74
Inset, sheet 47
Inset, sheet 64
Inset, sheet 57
Inset, sheet 56
Inset, sheet 21
Inset, sheet 71
Inset, sheet 75

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75

Hochheim
Yoakum
Concrete
Westhoff
Yorktown
CUERO
Arneckeville
Thomaston
Nordheim
Meyersville

DE WITT COUNTY
GONZALES COUNTY
LAVACA COUNTY
KARNES COUNTY
VICTORIA COUNTY
GOLIAD COUNTY

29°20′
29°10′
29°00′
28°50′
97°00′
97°10′
97°20′
97°30′
97°40′

SOIL LEGEND

The first capital letter is the initial one of the soil name. The second position is used to identify additional mapping units that have the same initial capital letter. This second position is a lowercase letter. The third position, if used, is a capital letter and connotes slope class. Symbols without a slope letter are for nearly level soils. A final number, 2, in the symbol shows the soil is eroded.

SYMBOL	NAME
BrA	Branyon clay, 0 to 1 percent slopes
Bu	Buchel clay, occasionally flooded
CaC	Catilla fine sand, 0 to 5 percent slopes
CrA	Crockett fine sandy loam, 0 to 1 percent slopes
CrB	Crockett fine sandy loam, 1 to 3 percent slopes
CrC	Crockett fine sandy loam, 3 to 5 percent slopes
CsC2	Crockett soils, 2 to 5 percent slopes, eroded
CuB	Cuero sandy clay loam, 0 to 2 percent slopes
De	Degola clay loam, occasionally flooded
Dg	Degola soils, frequently flooded
DuB	Denhawken-Elmendorf complex, 0 to 3 percent slopes
EdA	Edna fine sandy loam, 0 to 1 percent slopes
FeC2	Ferris soils, 3 to 5 percent slopes, eroded
FoA	Fordtran loamy fine sand, 0 to 1 percent slopes
GaB	Garcitas gravelly loamy fine sand, 0 to 3 percent slopes
GdD	Goldmire very gravelly soils, 1 to 8 percent slopes
HeB	Heiden clay, 1 to 3 percent slopes
HeC	Heiden clay, 3 to 5 percent slopes
HoA	Houston Black clay, 0 to 1 percent slopes
HoB	Houston Black clay, 1 to 3 percent slopes
LeC	Leemont clay, 3 to 5 percent slopes
LeD	Leemont clay, 5 to 8 percent slopes
LmC	Leming loamy fine sand, 0 to 5 percent slopes
LuD	Lupe gravelly sandy clay loam, 1 to 8 percent slopes
MaA	Mabank fine sandy loam, 0 to 1 percent slopes
MaB	Mabank fine sandy loam, 1 to 3 percent slopes
Me	Meguin silty clay loam, occasionallyflooded
Mf	Meguin soils, frequently flooded
MgC	Miguel fine sandy loam, 3 to 5 percent slopes
MgC2	Miguel fine sandy loam, 3 to 5 percent slopes, eroded
MoA	Monteola clay, 0 to 1 percent slopes
MoB	Monteola clay, 1 to 3 percent slopes
Na	Natraqualfs
NsC	Nueces-Sarita complex, 0 to 5 percent slopes
OrB	Orelia fine sandy loam, 0 to 2 percent slopes
PaA	Papalote fine sandy loam, 0 to 1 percent slopes
PaB	Papalote fine sandy loam, 1 to 3 percent slopes
RuA	Runge fine sandy loam, 0 to 1 percent slopes
RuB	Runge fine sandy loam, 1 to 3 percent slopes
RuC	Runge fine sandy loam, 3 to 5 percent slopes
SaA	Sarnosa fine sandy loam, 0 to 1 percent slopes
SaB	Sarnosa fine sandy loam, 1 to 3 percent slopes
SaC	Sarnosa fine sandy loam, 3 to 5 percent slopes
SaD	Sarnosa fine sandy loam, 5 to 8 percent slopes
SbC2	Sarnosa soils, 3 to 5 percent slopes, eroded
ShC	Shiner fine sandy loam, 1 to 5 percent slopes
ShD	Shiner fine sandy loam, 5 to 8 percent slopes
SkD	Silvern-Ellen complex, 1 to 8 percent slopes
Sn	Sinton loam
StA	Straber loamy fine sand, 0 to 1 percent slopes
StC	Straber loamy fine sand, 1 to 5 percent slopes
TeC	Tremona loamy fine sand, 0 to 5 percent slopes
TgC	Tremona gravelly loamy sand, 1 to 5 percent slopes
To	Trinity clay, occasionally flooded
Tr	Trinity clay, frequently flooded
VaD	Valco sandy clay loam, 1 to 8 percent slopes
WeB	Weesatche sandy clay loam, 1 to 3 percent slopes
WeC	Weesatche sandy clay loam, 3 to 5 percent slopes
WsA	Wilson clay loam, 0 to 1 percent slopes
WsB	Wilson clay loam, 1 to 3 percent slopes
Za	Zalla fine sand, occasionally flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (CeA; FoB2)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

DEWITT COUNTY, TEXAS NO. 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1

DE WITT COUNTY, TEXAS — SHEET NUMBER 2

2

N

1 Mile 5000 Feet

Scale 1:20000

2 540 000 FEET

550 000 FEET

540 000 FEET

2 520 000 FEET

(Joins sheet 6)

(Joins sheet 3)

GONZALES COUNTY

DEWITT COUNTY, TEXAS NO. 2

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 3

DEWITT COUNTY, TEXAS NO. 3

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 545 000 FEET

550 000 FEET

(Joins sheet 1)

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 7)

2 565 000 FEET

540 000 FEET

3

N

Scale 1:20000

1 Mile

5000 Feet

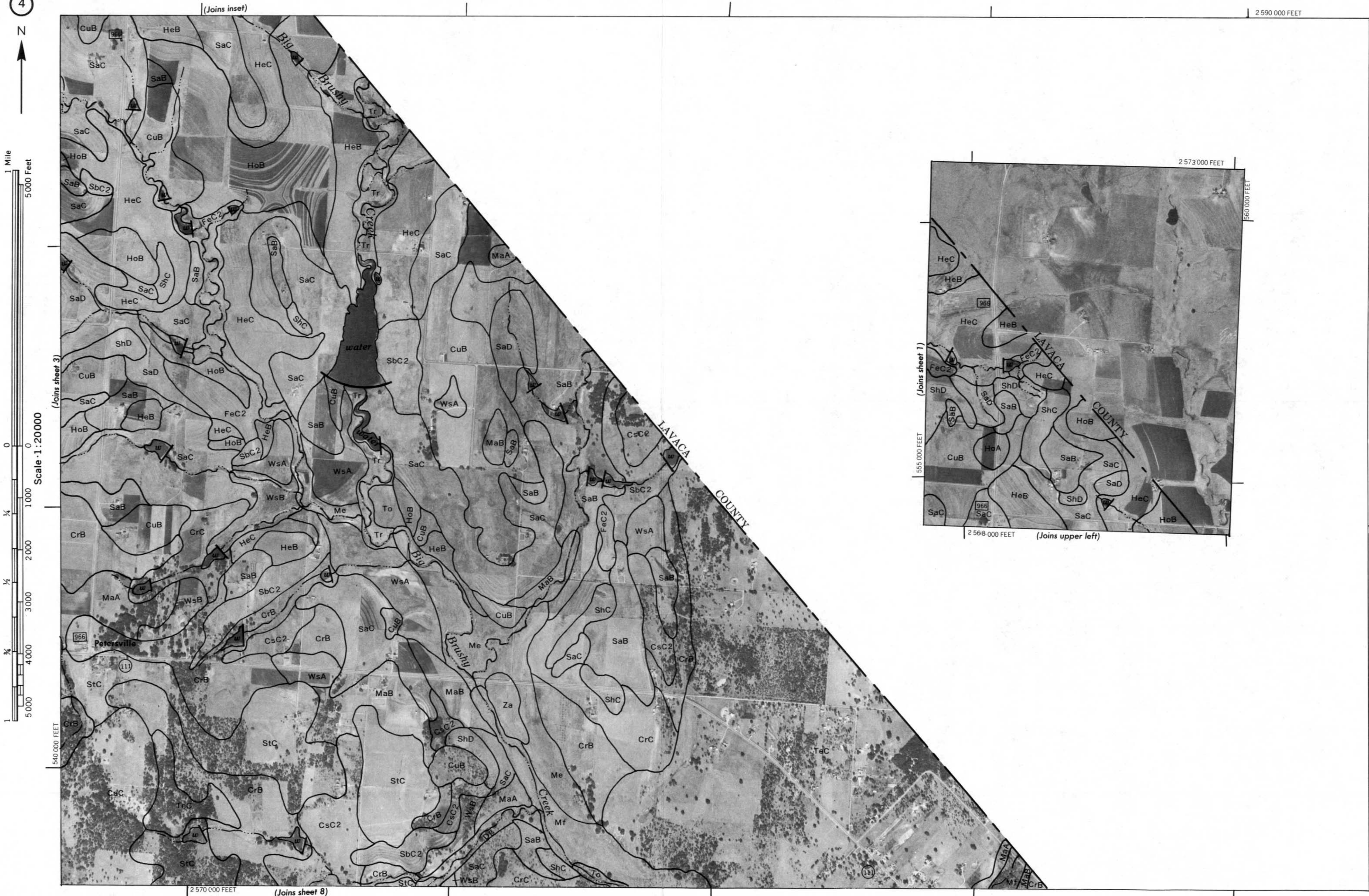
Guadalupe River

McCoy Creek

Queens Creek

Pearl City

Hochheim



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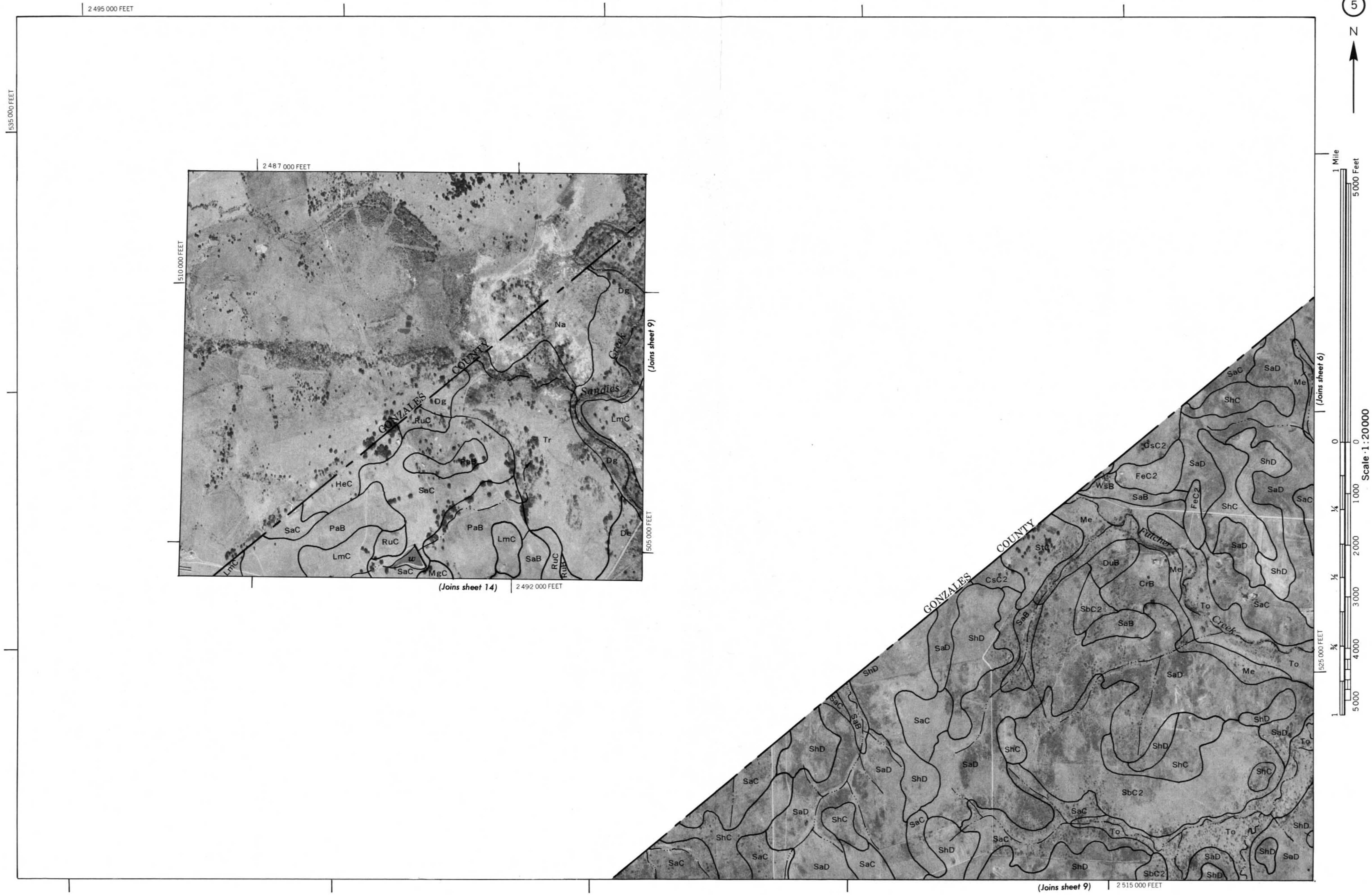
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



DEWITT COUNTY, TEXAS NO. 5

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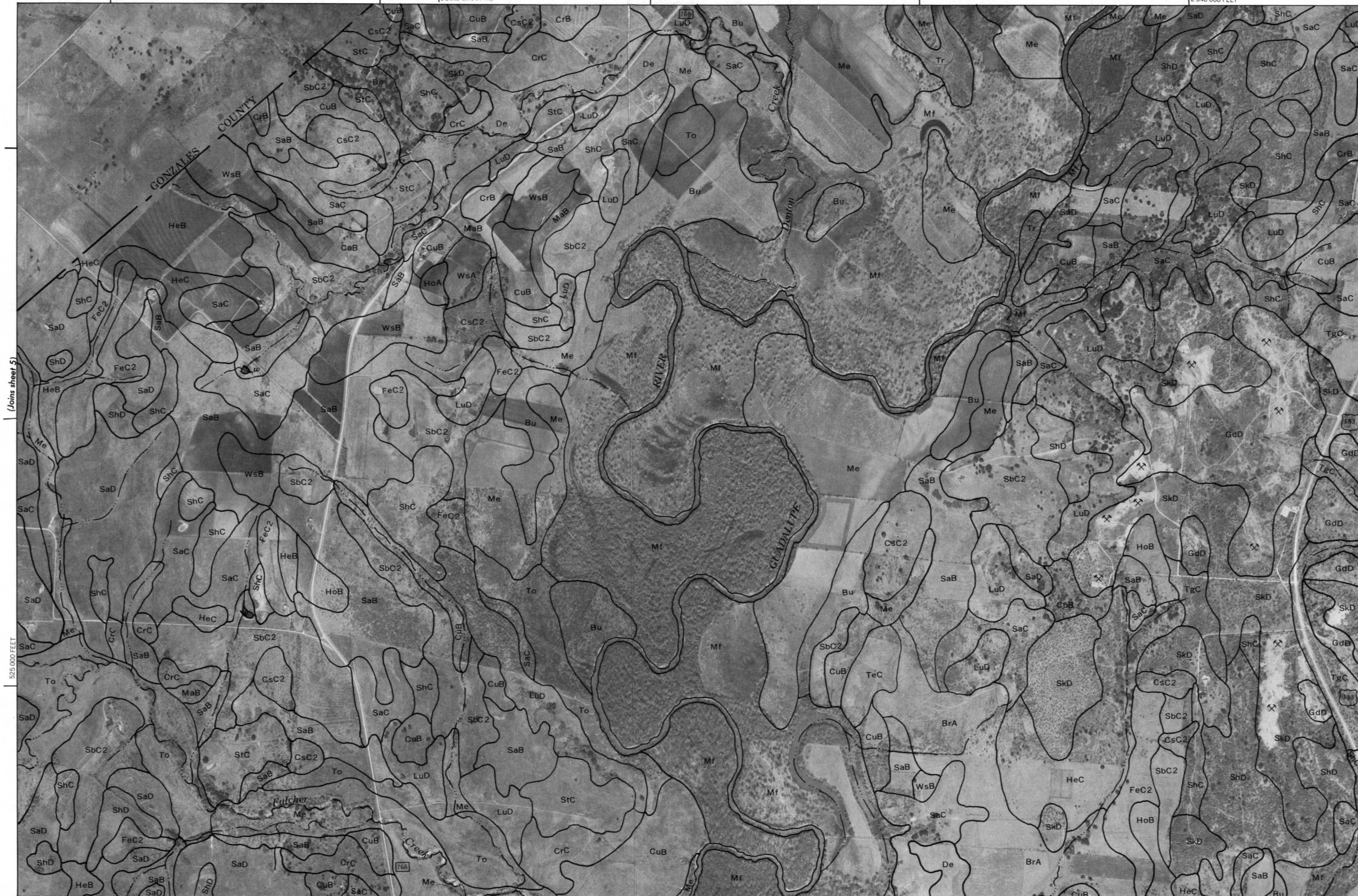
6

N

(Joins sheet 2)



(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 10)

Scale 1:20000

1 Mile — 0, ¼, ½, ¾, 1

5000 Feet — 0, 1000, 2000, 3000, 4000, 5000

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DE WITT COUNTY, TEXAS — SHEET NUMBER 7

DEWITT COUNTY, TEXAS NO. 7

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 545 000 FEET

535 000 FEET

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 11)

2 565 000 FEET

525 000 FEET

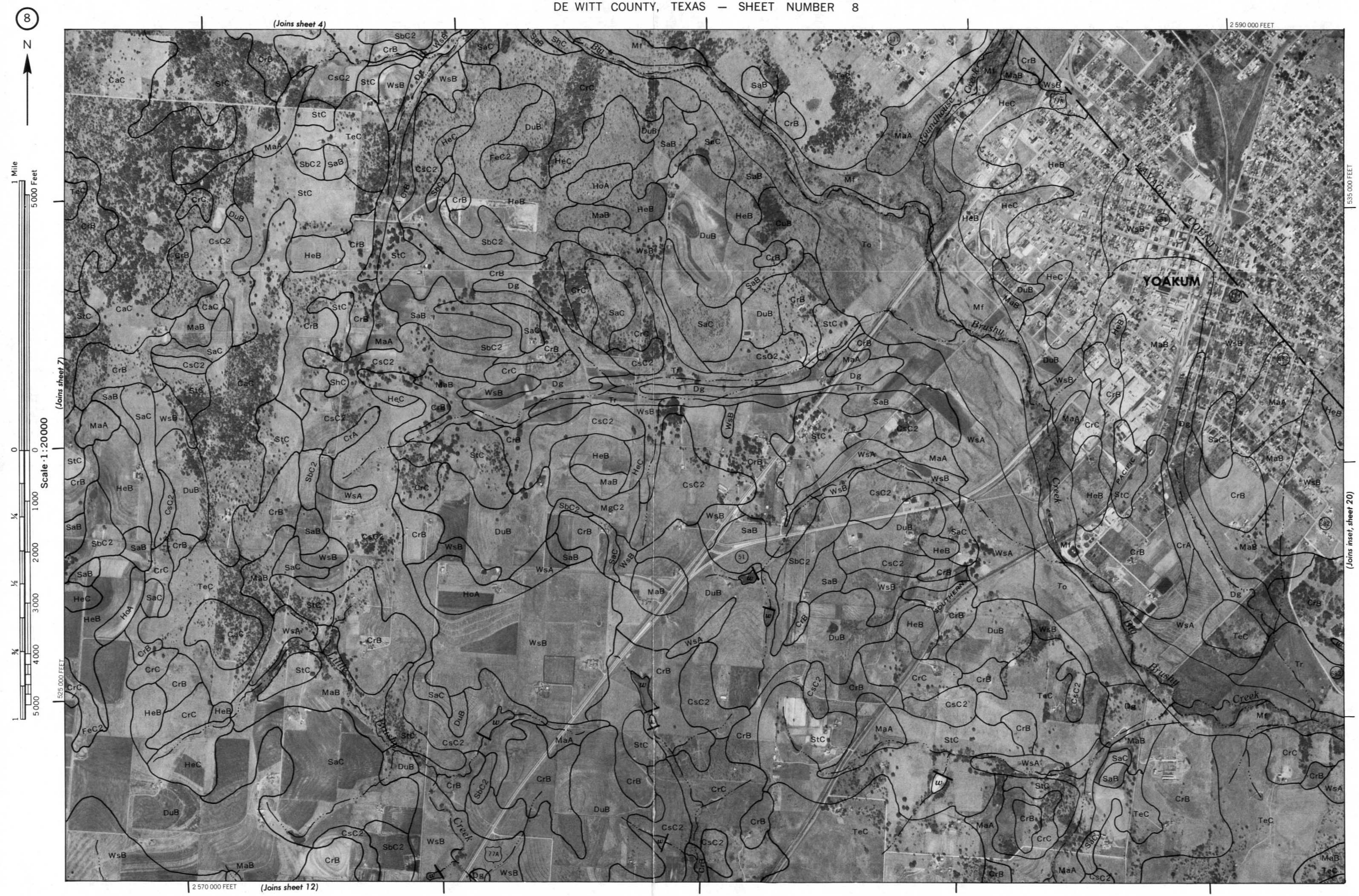
7

N

1 Mile

5000 Feet

Scale 1:20000



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DEWITT COUNTY, TEXAS NO. 8

DE WITT COUNTY, TEXAS — SHEET NUMBER 9

DEWITT COUNTY, TEXAS NO. 9

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 495 000 FEET

520 000 FEET

(Joins sheet 5)

(Joins inset, sheet 5)

(Joins sheet 10)

(Joins sheet 15)

2 515 000 FEET

505 000 FEET

GONZALES COUNTY

Sandies Creek

Smiths Creek

Boggy Creek

Scale 1:20000

1 Mile

5000 Feet

9

N

DE WITT COUNTY, TEXAS — SHEET NUMBER 10

10

N

(Joins sheet 6)

2 540 000 FEET

520 000 FEET

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 9)

505 000 FEET

2 520 000 FEET

(Joins sheet 16)

(Joins sheet 11)

Fletcher Creek

Willow Creek

Branch

GUADALUPE RIVER

McCoy Live Oak Creek

Creek

water

DEWITT COUNTY, TEXAS NO. 10

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Coordinate grid (Lucas and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 11

11

2 545 000 FEET

(Joins sheet 7)

520 000 FEET

(Joins sheet 12)

510 000 FEET

(Joins sheet 10)

(Joins sheet 17)

2 565 000 FEET

N

1 Mile

5000 Feet

Scale 1:20000

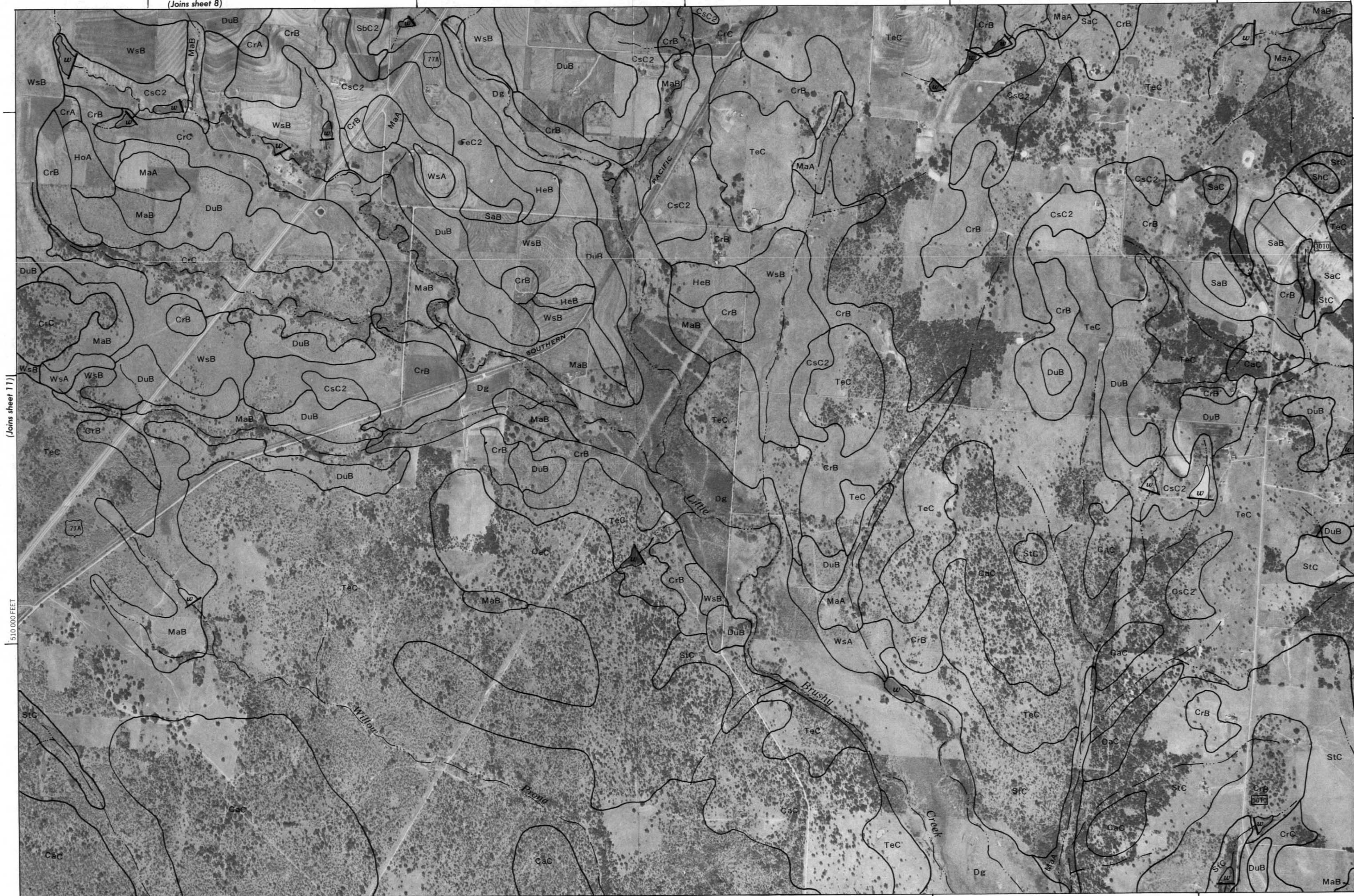
DEWITT COUNTY, TEXAS NO. 11

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

12

N

1 Mile
5000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1



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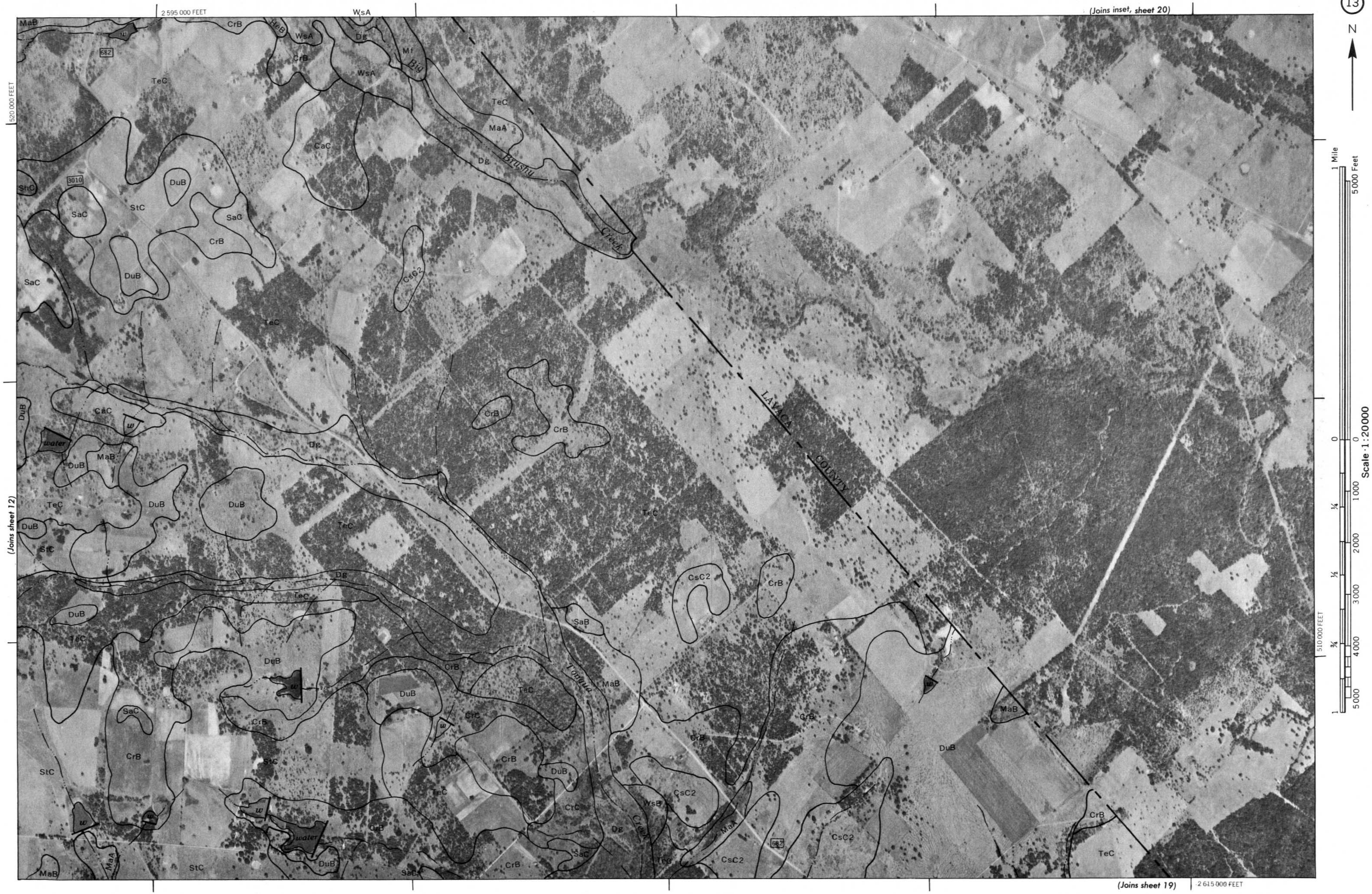

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DE WITT COUNTY, TEXAS — SHEET NUMBER 15

15

N

2 495 000 FEET

500 000 FEET

(Joins sheet 9)

(Joins sheet 16)

(Joins sheet 14)

(Joins sheet 23)

2 515 000 FEET

490 000 FEET

1 Mile

5000 Feet

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 15

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

16

N

(Joins sheet 10)

2 540 000 FEET

505 000 FEET

1 Mile

5 000 Feet

0

0

Scale 1:20000

¼ 1000

½ 2000

¾ 3000

1 4000

5000

(Joins sheet 15)

490 000 FEET

2 520 000 FEET

(Joins sheet 24)

(Joins sheet 17)

McCoy Creek

GUADALUPE RIVER

Sandies Creek

Clear Creek

766

183

This map is compiled on 1979 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 16

DEWITT COUNTY, TEXAS NO. 17

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 545 000 FEET

505 000 FEET

(Joins sheet 11)

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 25)

2 565 000 FEET

490 000 FEET

17

N

1 Mile

5000 Feet

Scale 1:20000

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

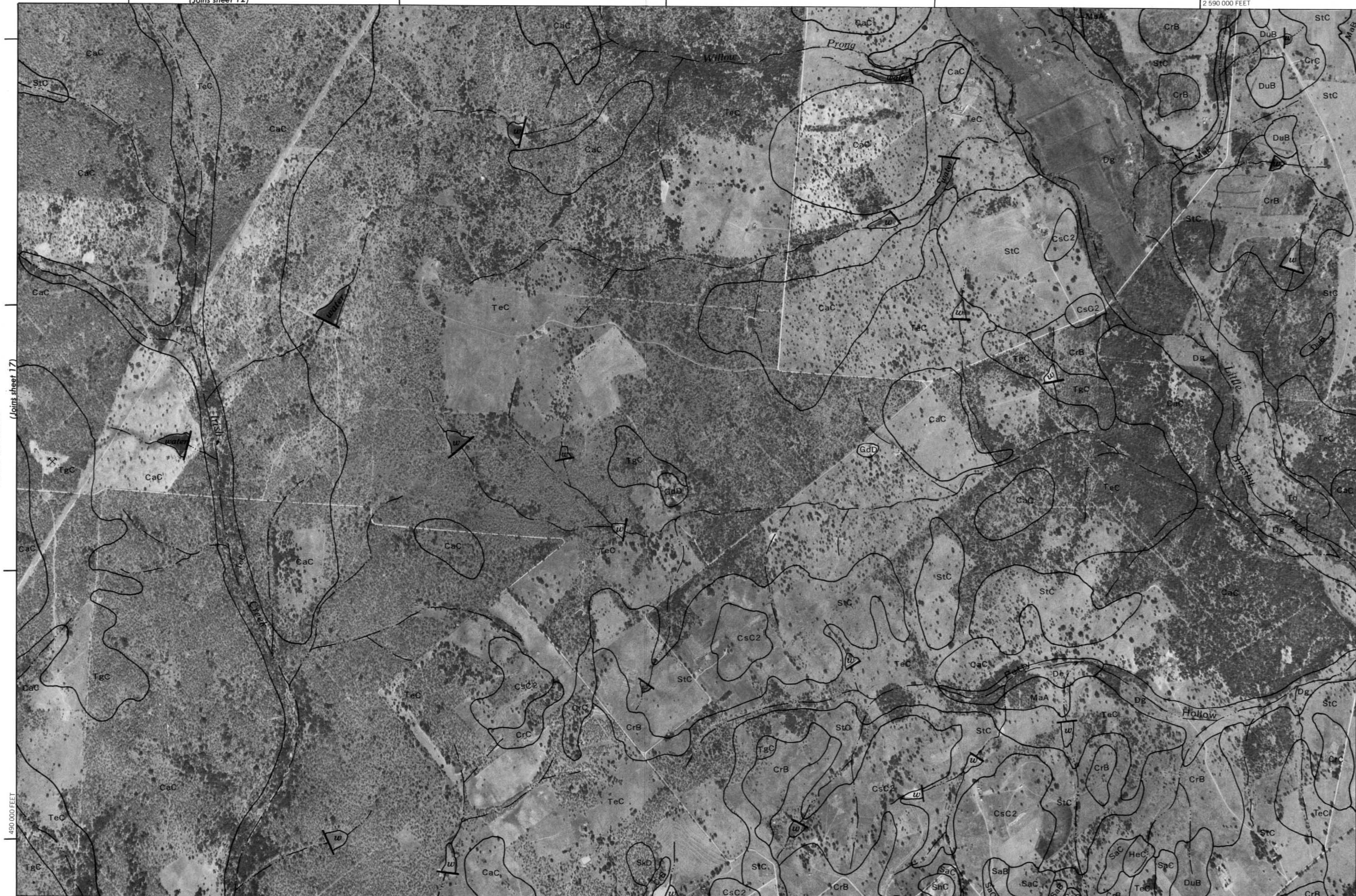
Edgar

Creek

water

PACIFIC

SOUTHERN



Scale 1:20000
1 Mile
5000 Feet
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 18

DEWITT COUNTY, TEXAS NO. 19

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 595 000 FEET

505 000 FEET

(Joins sheet 13)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 27)

2 615 000 FEET

490 000 FEET

LAVACA COUNTY

Terryville

Tenaha Creek

Williams Branch

Little Petty Hollow Creek

Brushy Creek

Little Tenaha Creek

water

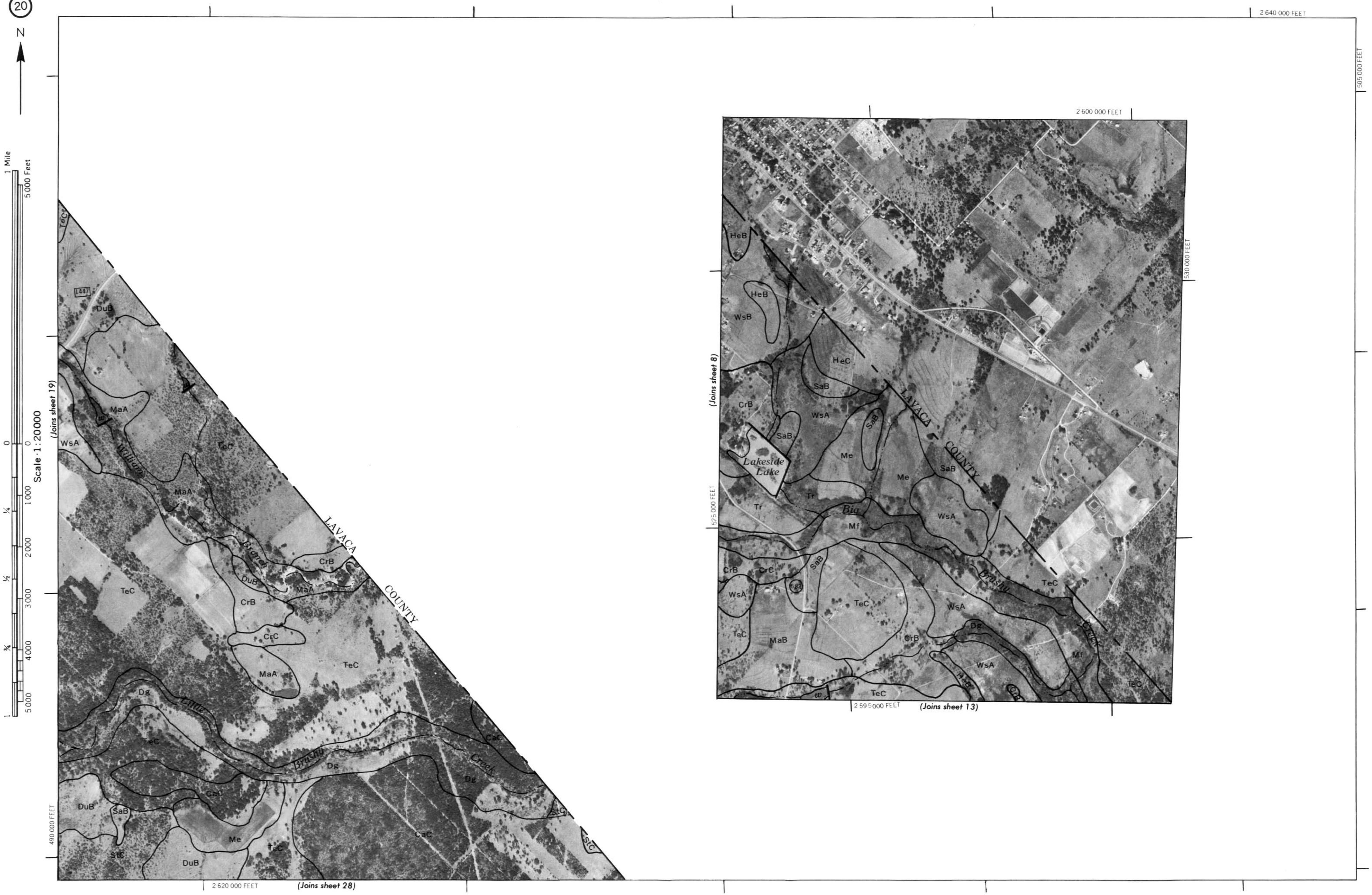
19

N

1 Mile

5000 Feet

Scale 1:20000



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DEWITT COUNTY, TEXAS NO. 20

DEWITT COUNTY, TEXAS NO. 21

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 450 000 FEET

2 545 000 FEET

(Joins sheet 70)

485 000 FEET

390 000 FEET

(Joins sheet 74)

2 555 000 FEET

(Joins inset, sheet 74)

(Joins sheet 22)

380 000 FEET

475 000 FEET

(Joins sheet 30)

2 470 000 FEET

COUNTY

VICTORIA

GONZALES

Nopal

Shoats Creek

21

N

1 Mile

5000 Feet

Scale 1:20000

22

N

(Joins sheet 14)

2 490 000 FEET

485 000 FEET

(Joins sheet 21)

475 000 FEET

2 470 000 FEET

(Joins sheet 31)

(Joins sheet 23)

1 Mile

5 000 Feet

Scale 1:20000

0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 22

DE WITT COUNTY, TEXAS — SHEET NUMBER 23

23

N

2 495 000 FEET

485 000 FEET

(Joins sheet 15)

(Joins sheet 22)

(Joins sheet 24)

2 515 000 FEET

475 000 FEET

(Joins sheet 32)

Scale 1:20000

1 Mile

5000 Feet

DEWITT COUNTY, TEXAS NO. 23

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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DE WITT COUNTY, TEXAS — SHEET NUMBER 25

25

N

2 545 000 FEET

485 000 FEET

475 000 FEET

(Joins sheet 17)

(Joins sheet 24)

(Joins sheet 26)

(Joins sheet 34)

2 565 000 FEET

1 Mile

5000 Feet

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 25

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

26

N

1 Mile
5 000 Feet
Scale 1:20000
0 0
¼ 1 000
½ 2 000
¾ 4 000
1 5 000

(Joins sheet 18)

2 590 000 FEET

485 000 FEET

(Joins sheet 25)

(Joins sheet 27)

475 000 FEET

2 570 000 FEET

(Joins sheet 35)

1447

Shatton

Chicolete Creek

Water

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 26

DE WITT COUNTY, TEXAS — SHEET NUMBER 27

DEWITT COUNTY, TEXAS NO. 27

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid tricks and land division corners, if shown, are approximately positioned.

2 595 000 FEET

485 000 FEET

(Joins sheet 19)

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 36)

2 615 000 FEET

475 000 FEET

27

N

1 Mile

5000 Feet

Scale 1:20000

28

N

(Joins sheet 20)

2 640 000 FEET

490 000 FEET

1 Mile

5000 Feet

Scale 1:20000

0 0 ¼ 1000 ½ 2000 ¾ 3000 1 4000 5000

475 000 FEET

2 620 000 FEET

(Joins sheet 27)

(Joins sheet 37)

Bear Creek

Dry Hollow Branch

JAVACA COUNTY

682

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 28

29

N

Scale 1:20000

1 Mile

5000 Feet

(Joins sheet 30)

(Joins sheet 39)

DEWITT COUNTY, TEXAS NO. 29

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 30

(30)

N

(Joins sheet 21)

GONZALES COUNTY

2 470 000 FEET

470 000 FEET

460 000 FEET

(Joins sheet 29)

(Joins sheet 31)

(Joins sheet 40)

2 450 000 FEET

Scale 1:20000

1 Mile 5000 Feet

0 0

¼ 1000 2000

½ 3000

¾ 4000

1 5000

Clear Creek

Little Salt Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 30

DE WITT COUNTY, TEXAS — SHEET NUMBER 31

DEWITT COUNTY, TEXAS NO. 31

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 470 000 FEET

470 000 FEET

(Joins sheet 22)

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 41)

2 495 000 FEET

460 000 FEET

31

N

1 Mile

5000 Feet

Scale 1:20000

DE WITT COUNTY, TEXAS — SHEET NUMBER 32

32

N

(Joins sheet 23)

2 515 000 FEET

470 000 FEET

460 000 FEET

2 495 000 FEET

(Joins sheet 42)

(Joins sheet 31)

(Joins sheet 33)

Scale 1:20000

1 Mile

5000 Feet

Blackhawk Creek

Deer Creek

Blackwell Lake

Water

2542

953

87

DE WITT COUNTY, TEXAS NO. 32

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 33

DEWITT COUNTY, TEXAS NO. 33

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 520 000 FEET

470 000 FEET

(Joins sheet 24)

(Joins sheet 32)

(Joins sheet 43)

2 540 000 FEET

460 000 FEET

(Joins sheet 34)

CUERO
(county seat)

Lindenau

Sanders Creek

Lost Creek

Gohlke Creek

Southern Pacific

GUADALUPE RIVER

33

N

1 Mile

5000 Feet

Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 34

DE WITT COUNTY, TEXAS — SHEET NUMBER 35

35

N

2 570 000 FEET

470 000 FEET

(Joins sheet 26)

(Joins sheet 34)

(Joins sheet 36)

(Joins sheet 45)

2 590 000 FEET

460 000 FEET

1 Mile

5000 Feet

Scale 1:20000

TEXAS NO. 35

DEWITT COUNTY, TEXAS

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Hollow

Creek

Fork

36

N

(Joins sheet 27)

2 615 000 FEET

470 000 FEET

460 000 FEET

(Joins sheet 35)

(Joins sheet 37)

2 595 000 FEET (Joins sheet 46)

1 Mile 5 000 Feet

Scale 1:20000

0 0

1/4 1000

1/2 2000

3/4 3000

1 4000 5000

GaB EdA SkD TgC WsA FoA DuB CrB CrA TeC water

SOUTH CHICOLETE CREEK

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 36

DE WITT COUNTY, TEXAS — SHEET NUMBER 37

37

N

(Joins sheet 28)

2 620 000 FEET

470 000 FEET

(Joins sheet 36)

460 000 FEET

(Joins sheet 47)

2 640 000 FEET

LAVACA COUNTY

VICTORIA COUNTY

Peck Branch

Chicolete Creek

SOUTH CHICOLETE CREEK

Scale 1:20000

1 Mile

5000 Feet

DEWITT COUNTY, TEXAS NO. 37

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 38

38

N

1 Mile
5000 Feet

Scale 1:20000

2 420 000 FEET

455 000 FEET

440 000 FEET

2 400 000 FEET

KARNES COUNTY

Creek

MoB
PaB
SaB
SaC
RuB
LeC
RuA
MgC
OrB
WsB
ShC
DuB

(Joins sheet 39)

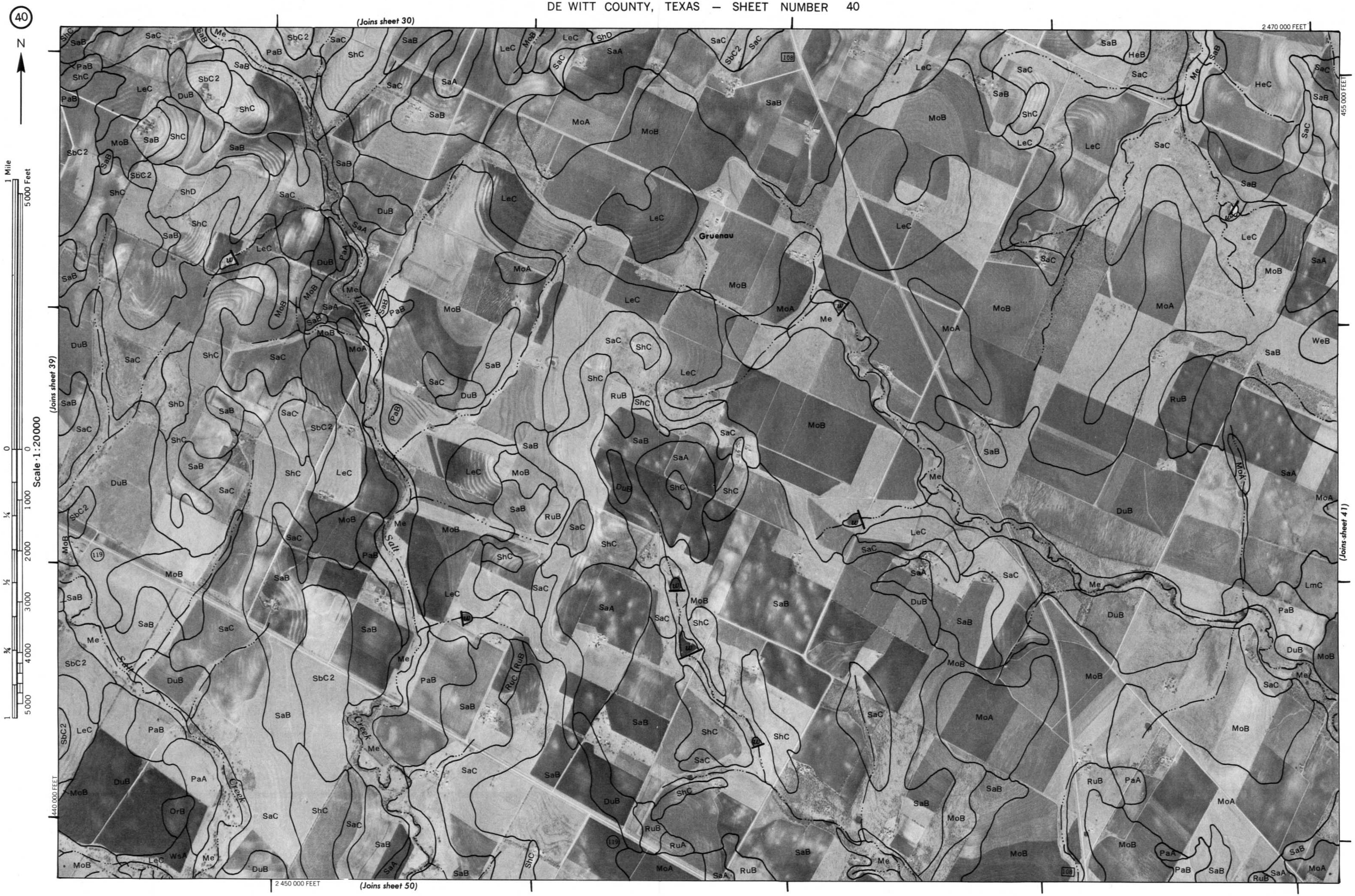
(Joins sheet 48)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 38

DEWITT COUNTY, TEXAS NO. 39

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 40

DE WITT COUNTY, TEXAS — SHEET NUMBER 41

41

N

2 475 000 FEET

455 000 FEET

(Joins sheet 31)

(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 51)

440 000 FEET

2 495 000 FEET

1 Mile

5000 Feet

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 41

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(42)

N

(Joins sheet 32)

2 515 000 FEET

455 000 FEET

(Joins sheet 41)

440 000 FEET

2 495 000 FEET

(Joins sheet 52)

(Joins sheet 43)

Scale 1:20000

1 Mile 0 ¼ ½ ¾ 1

5000 Feet 0 1000 2000 3000 4000 5000

Deer Creek

Shiloh Creek

Peninsula Cuero Creek

water

This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 42

DE WITT COUNTY, TEXAS — SHEET NUMBER 43

DEWITT COUNTY, TEXAS NO. 43

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 520 000 FEET

455 000 FEET

(Joins sheet 33)

(Joins sheet 42)

(Joins sheet 44)

2 540 000 FEET

(Joins sheet 53)

440 000 FEET

GUADALUPE RIVER

Last Creek

43

N

1 Mile 5000 Feet

Scale 1:20000

0 0 1/4 1/2 3/4 1

1000 2000 3000 4000 5000

DE WITT COUNTY, TEXAS — SHEET NUMBER 44

(44)

N

(Joins sheet 34)

2 565 000 FEET

455 000 FEET

(Joins sheet 43)

440 000 FEET

2 545 000 FEET

(Joins sheet 54)

(Joins sheet 45)

Scale 1:20000

1 Mile 0 5000 Feet

¼ 1000 ½ 2000 ¾ 4000 1 5000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 44

DEWITT COUNTY, TEXAS NO. 45

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 570 000 FEET

455 000 FEET

(Joins sheet 35)

(Joins sheet 44)

(Joins sheet 46)

445 000 FEET

(Joins sheet 55)

2 590 000 FEET

45

N

1 Mile

5000 Feet

Scale 1:20000

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Verhelle

SOUTHERN PACIFIC

GUADALUPE RIVER

Reeds Branch

46

N

(Joins sheet 36)

2 615 000 FEET

455 000 FEET

(Joins sheet 45)

(Joins sheet 47)

445 000 FEET

2 595 000 FEET

(Joins sheet 56)

Scale · 1 : 20000

1 Mile 5 000 Feet

0 0 ¼ 1000 ½ 2000 ¾ 4000 1 5000

GaB EdA FoA WsA TeC StC TgC SfA GdD SkD SaB MaB TaC LuD

South Chicolete Creek Garcitas Creek water

VICTORIA COUNTY

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 46

DE WITT COUNTY, TEXAS — SHEET NUMBER 47

47

DEWITT COUNTY, TEXAS NO. 47

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 620 000 FEET

455 000 FEET

(Joins sheet 37)

(Joins sheet 46)

South Chocolate Creek

COUNTY

VICTORIA

FoA EdA GaB GdD TeC CaC SkD TgC StA

2 647 000 FEET

272 000 FEET

(Joins sheet 37)

467000 FEET

445 000 FEET

LAVACA COUNTY

Peck Branch

TeC StC StA MaA Dg StO De CaC SkD EdA

VICTORIA COUNTY

2 643 000 FEET

2 640 000 FEET

4000 AND 5000-FOOT GRID TICKS

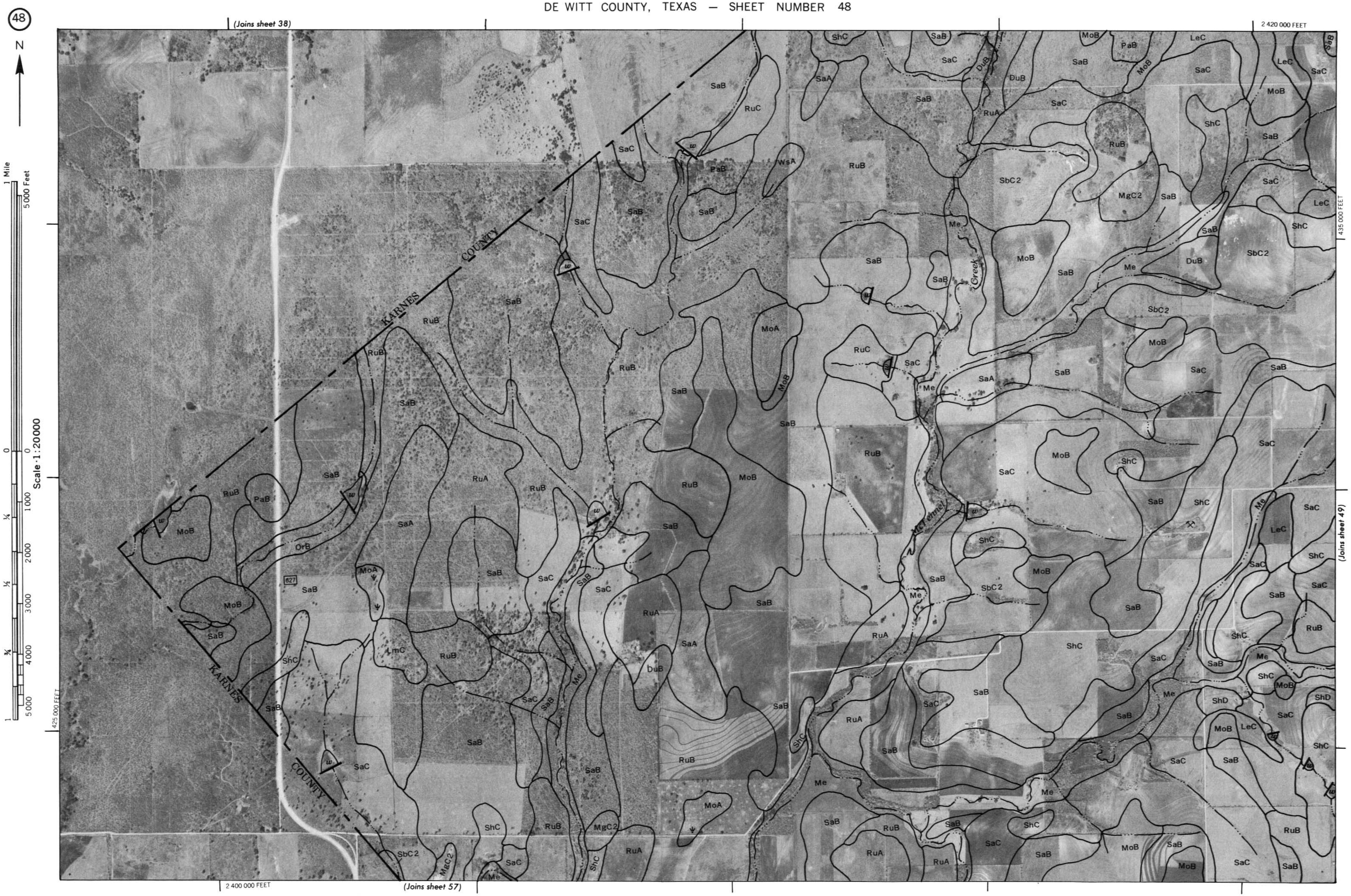
N

1 Mile

5000 Feet

Scale 1:20000

DE WITT COUNTY, TEXAS — SHEET NUMBER 48



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 48

DE WITT COUNTY, TEXAS — SHEET NUMBER 49

49

N

2 425 000 FEET

435 000 FEET

(Joins sheet 39)

(Joins sheet 48)

(Joins sheet 50)

(Joins sheet 58)

2 445 000 FEET

425 000 FEET

1 Mile

5000 Feet

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 49

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 50

50

N

1 Mile
5000 Feet

Scale 1:20000

(Joins sheet 40)

2 470 000 FEET

435 000 FEET

(Joins sheet 49)

425 000 FEET

2 450 000 FEET

(Joins sheet 59)

(Joins sheet 51)

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 50

DE WITT COUNTY, TEXAS — SHEET NUMBER 51

DEWITT COUNTY, TEXAS NO. 51

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 475 000 FEET

435 000 FEET

(Joins sheet 41)

(Joins sheet 50)

(Joins sheet 52)

(Joins sheet 60)

2 495 000 FEET

425 000 FEET

YORKTOWN

Yorktown Creek

Woods Creek

N

1 Mile

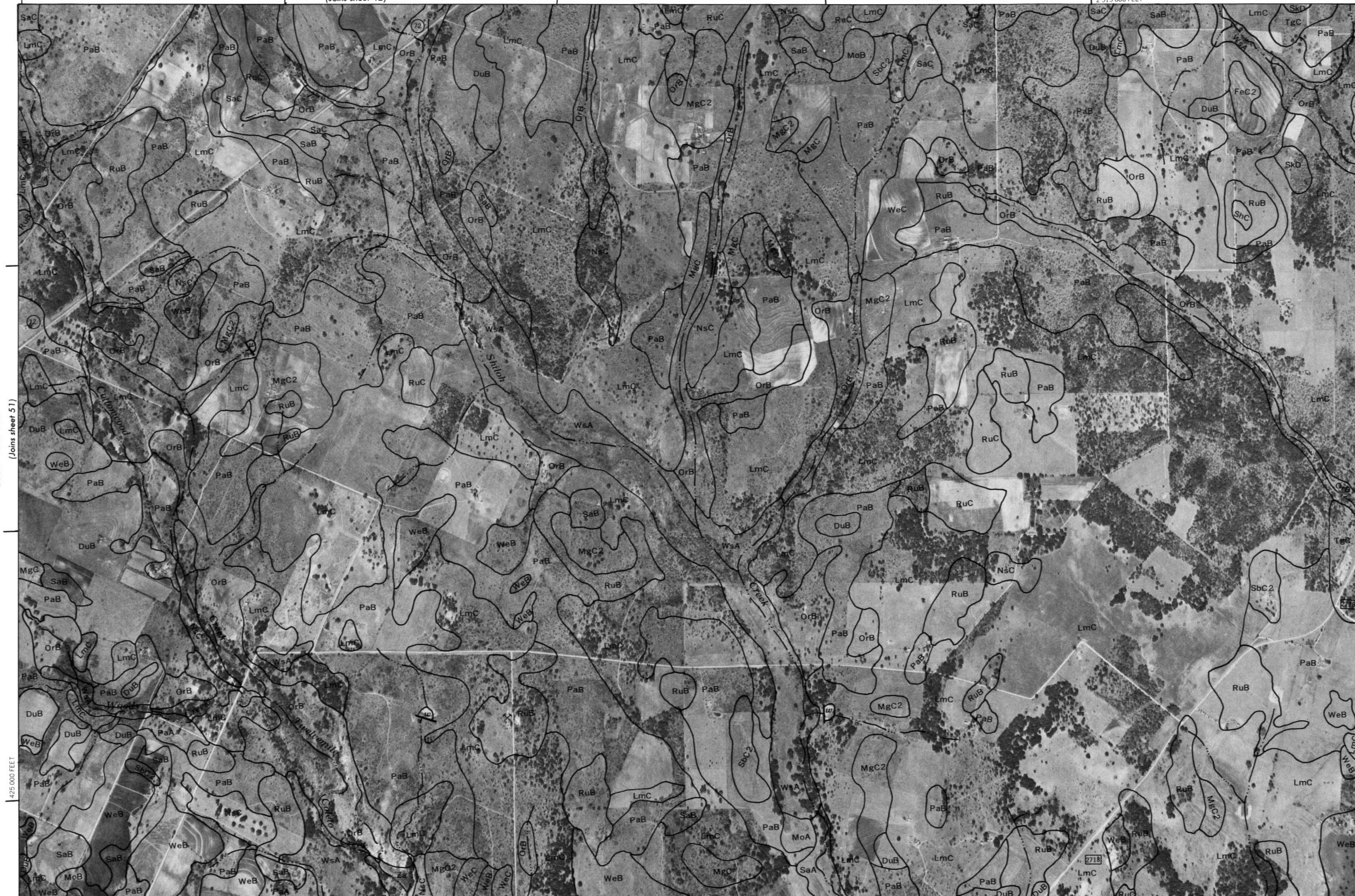
5000 Feet

Scale 1:20000

52

N

1 Mile
5000 Feet
Scale 1:20000



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

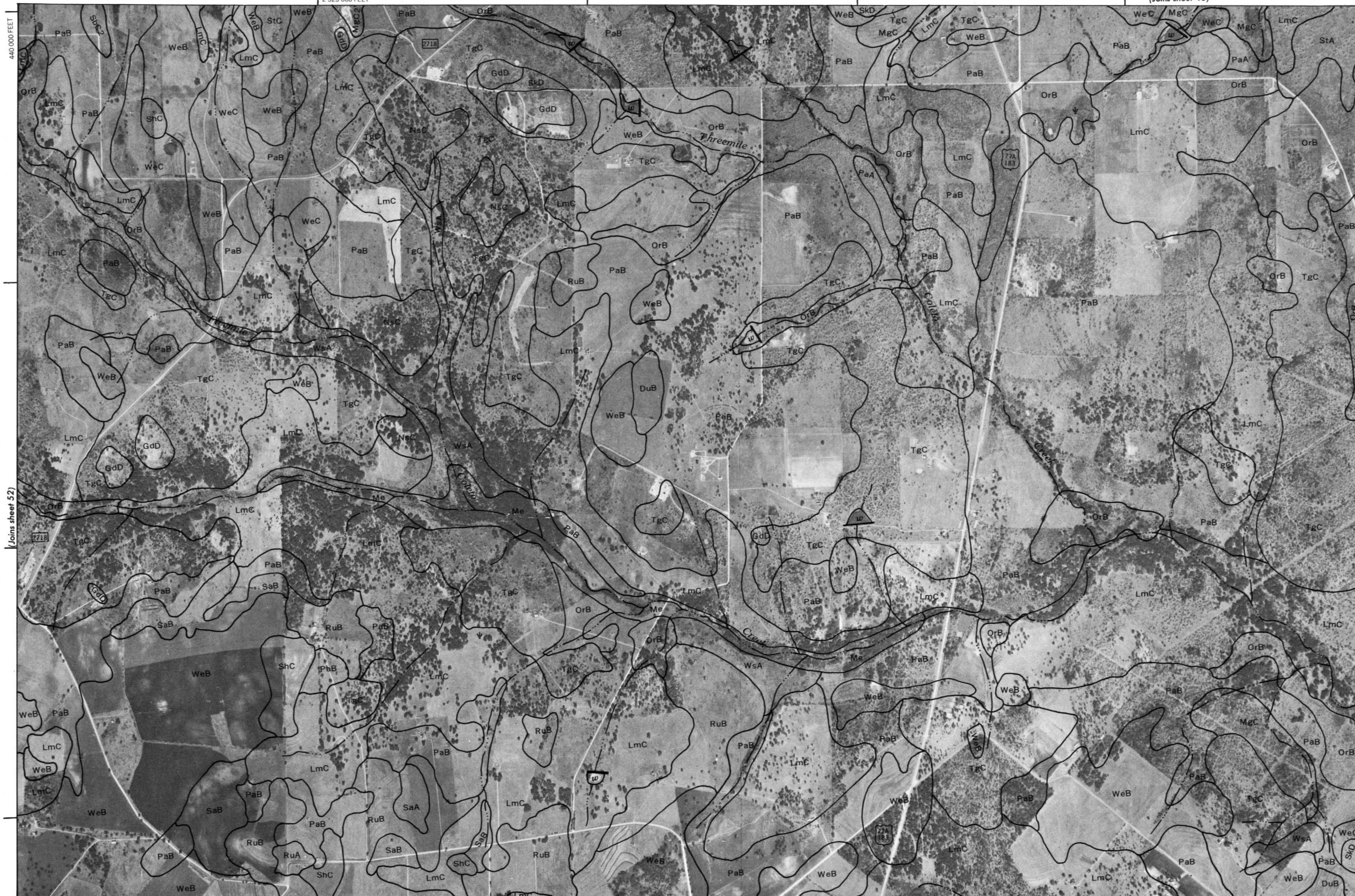
DEWITT COUNTY, TEXAS NO. 52

53

(Joins sheet 43)

2 525 000 FEET

440 000 FEET



(Joins sheet 52)

(Joins sheet 54)

425 000 FEET

(Joins sheet 62) 2 540 000 FEET

N

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 53

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 54

54

N

(Joins sheet 44)

2 565 000 FEET

440 000 FEET

(Joins sheet 53)

(Joins sheet 55)

425 000 FEET

2 545 000 FEET

(Joins sheet 63)

1 Mile

5 000 Feet

Scale 1:20000

Arneckeville

Carlisle

North Fork

Cuero Creek

Clear Creek

Agriculture, Soil Conservation Service and cooperating agencies.
This map is compiled on 1975 aerial photography by the U. S. Department of
shown, are approximately positioned.
Coordinate grid ticks and land division corners, if shown, are approx

TEXAS NO. 54

DEWITT COUNTY, TEXAS

DE WITT COUNTY, TEXAS — SHEET NUMBER 55

DEWITT COUNTY, TEXAS NO. 55

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 570 000 FEET

440 000 FEET

(Joins sheet 45)

55

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 56)

(Joins sheet 54)

425 000 FEET

(Joins sheet 64)

2 590 000 FEET

Thomaston

Reeds Branch

Reeds Creek

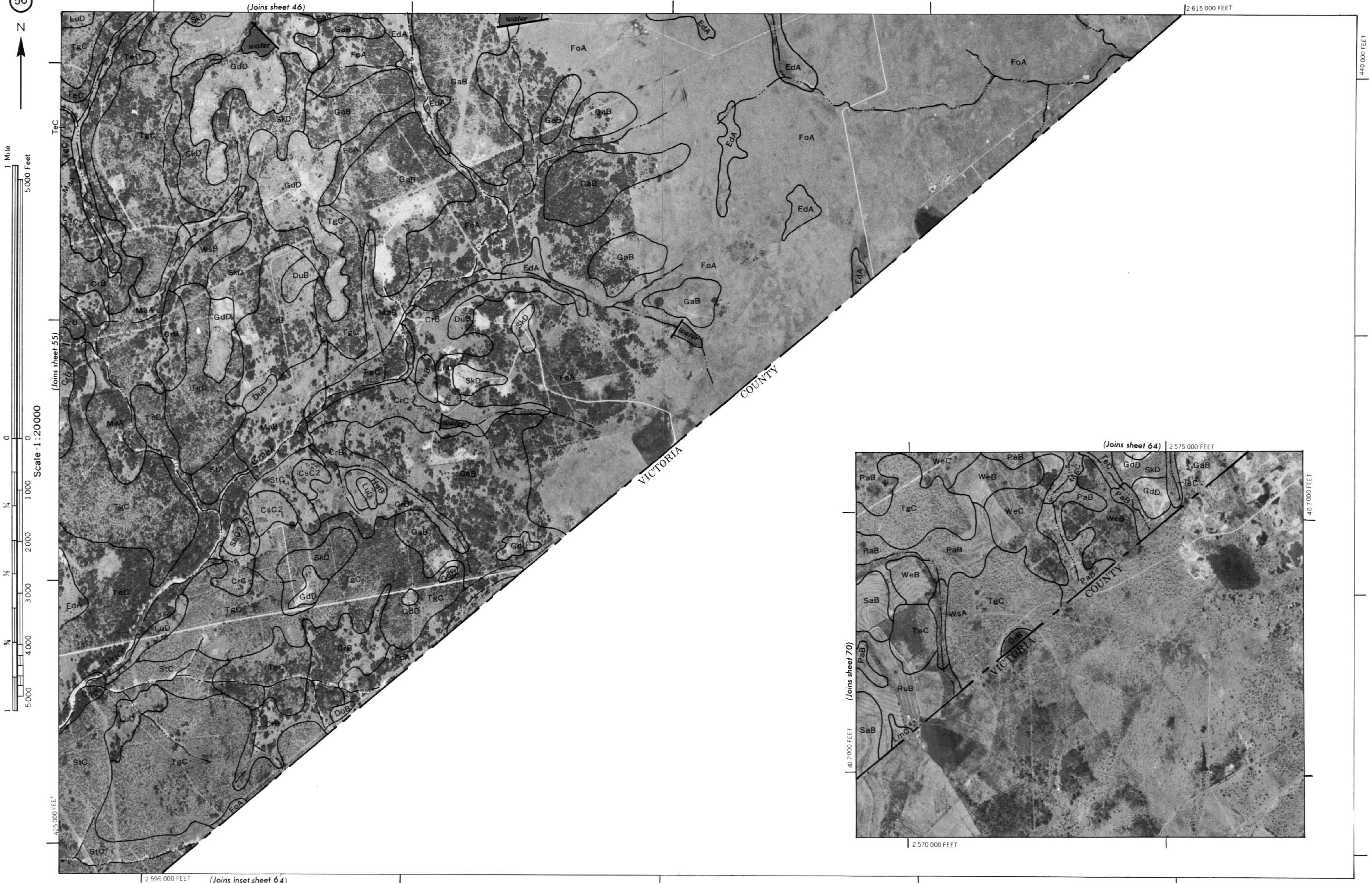
Pryce Creek

GUADALUPE RIVER

SOUTHERN PACIFIC

water

DE WITT COUNTY, TEXAS — SHEET NUMBER 56



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 56

DEWITT COUNTY, TEXAS NO. 57

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 400 000 FEET

420 000 FEET

(Joins sheet 48)

2 417 000 FEET

(Joins lower right)

405 000 FEET

(Joins sheet 65)

400 000 FEET

2 421 000 FEET

4000 AND 5000-FOOT GRID TICKS

KARNES COUNTY

McFennel Creek

(Joins sheet 58)

410 000 FEET

(Joins upper left)

2 420 000 FEET

57

N

1 Mile

5 000 Feet

Scale 1:20000

58

N

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 49)

(Joins sheet 57)

(Joins sheet 59)

(Joins sheet 65)

2 445 000 FEET

2 425 000 FEET

420 000 FEET

410 000 FEET

Cotton Patch

Butler Creek

Cabeza Creek

Thomas Creek

Bound Branch

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 58

DE WITT COUNTY, TEXAS — SHEET NUMBER 59

59

N

2 450 000 FEET

4260000 FEET

(Joins sheet 50)

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 66)

2 470 000 FEET

410 000 FEET

1 Mile

5000 Feet

Scale 1:20000

DEWITT COUNTY, TEXAS NO. 59

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DE WITT COUNTY, TEXAS — SHEET NUMBER 60

60

N

Scale 1:20000

1 Mile 5000 Feet

0 0 ¼ ½ ¾ 1

1000 2000 3000 4000 5000

(Joins sheet 51)

(Joins sheet 59)

(Joins sheet 61)

(Joins sheet 67)

2 495 000 FEET

420 000 FEET

410 000 FEET

2 475 000 FEET

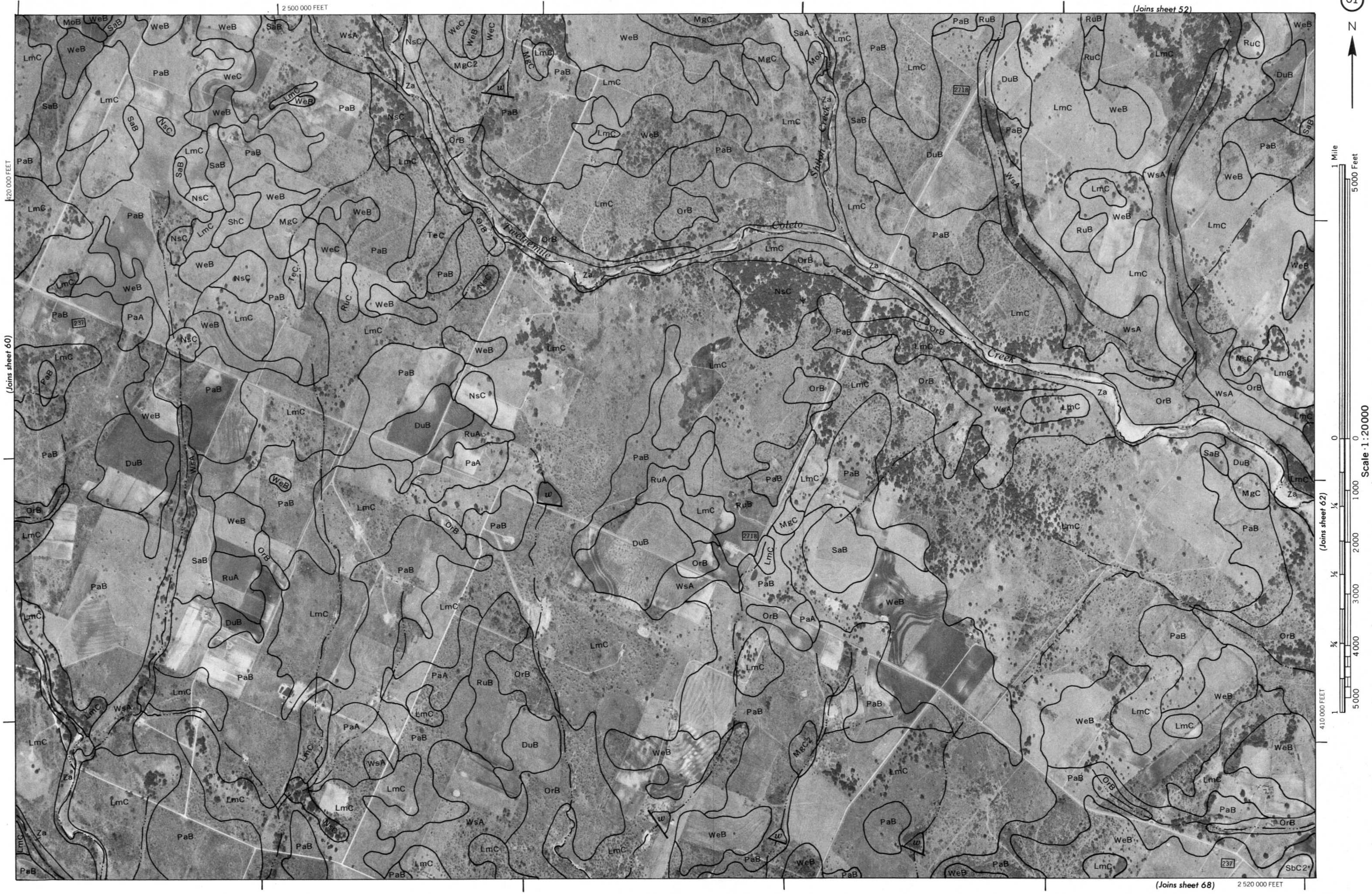
YORKTOWN

Yorktown

Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 60



DEWITT COUNTY, TEXAS NO. 61

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:20000

1 Mile 5000 Feet

0 0 ¼ ½ ¾ 1 1000 2000 3000 4000 5000

(Joins sheet 53)

(Joins sheet 61)

(Joins sheet 63)

(Joins sheet 69)

2 540 000 FEET

420 000 FEET

410 000 FEET

2 520 000 FEET

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 62

DE WITT COUNTY, TEXAS — SHEET NUMBER 63

DEWITT COUNTY, TEXAS NO. 63

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 545 000 FEET

420 000 FEET

(Joins sheet 62)

(Joins sheet 54)

(Joins sheet 64)

410 000 FEET

2 565 000 FEET

(Joins sheet 70)

63

N

1 Mile

5000 Feet

Scale 1:20000

0 1/4 1/2 3/4 1

0 1000 2000 3000 4000 5000

64

N

1 Mile
5000 Feet

Scale 1:20000

(Joins sheet 55)

(Joins sheet 63)

(Joins inset, sheet 56)

2 590 000 FEET

420 000 FEET

410 000 FEET

2 570 000 FEET

(Joins inset)

GUADALUPE RIVER

VICTORIA COUNTY

SOUTHERN PACIFIC RR

(Joins sheet 56)

2 596 000 FEET

425 000 FEET

423 000 FEET

(Joins sheet 64)

2 594 000 FEET

2000-FOOT GRID TICKS

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 64

DE WITT COUNTY, TEXAS — SHEET NUMBER 65

65

DEWITT COUNTY, TEXAS NO. 65

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 425 000 FEET

405 000 FEET

(Joins inset, sheet 57)

(Joins sheet 58)

N

1 Mile
5,000 Feet

Scale 1:20000

(Joins sheet 66)

Nordheim

KARNES COUNTY

(Joins sheet 71)

2 445 000 FEET

390 000 FEET

DE WITT COUNTY, TEXAS — SHEET NUMBER 66

(66)

N

(Joins sheet 59)

2 470 000 FEET

405 000 FEET

1 Mile

5000 Feet

Scale 1:20000

(Joins sheet 65)

(Joins sheet 67)

390 000 FEET

2 450 000 FEET

(Joins sheet 72)

Manahuilla Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 66

DEWITT COUNTY, TEXAS NO. 67

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

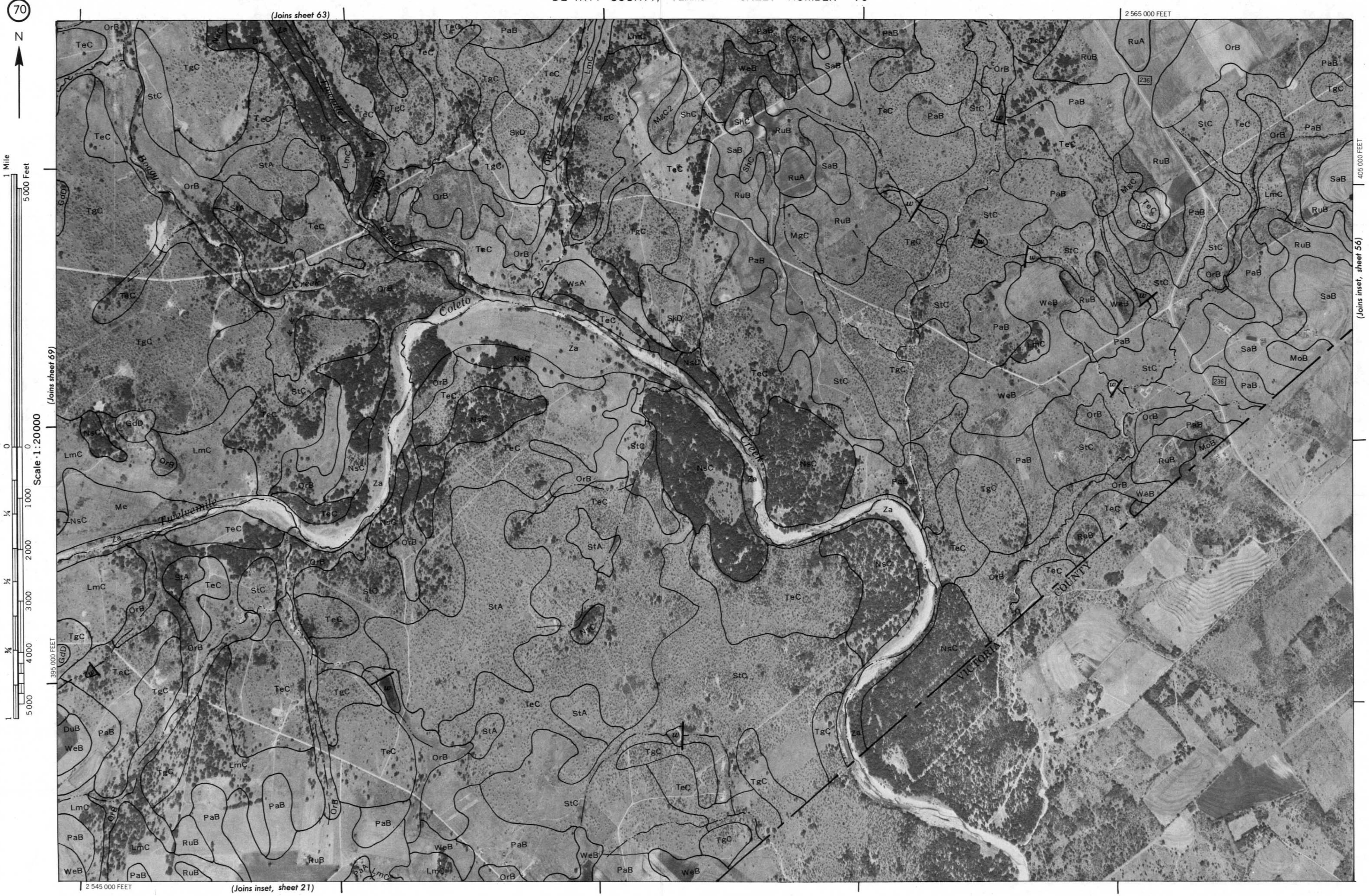
69

N

1 Mile
5000 Feet
0
Scale 1:20000
1000
2000
3000
4000
5000

DEWITT COUNTY, TEXAS NO. 69

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 71'

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned

2 425 000 FEET

390 000 FEET

(Joins sheet 65)

N

(Joins lower right) 2 444 000 FEET

374 000 FEET

(Joins sheet 75)

370 000 FEET

2 446 000 FEET

2000 AND 4000-FOOT GRID TICKS

KARNES COUNTY

Cibolo Creek

(Joins sheet 72)

375 000 FEET

(Joins inset)

2 445 000 FEET

1 Mile
5,000 Feet
Scale 1:20000

72

N

(Joins sheet 66)

2 470 000 FEET

390 000 FEET

(Joins sheet 71)

(Joins sheet 73)

375 000 FEET

2 450 000 FEET

(Joins sheet 75)

1 Mile

5 000 Feet

Scale - 1:20000

1 0 ¾ ½ ¼ 0 1 000 2 000 3 000 4 000 5 000

Manahuilla

Creek

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 72

DE WITT COUNTY, TEXAS — SHEET NUMBER 73

DEWITT COUNTY, TEXAS NO. 73

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 475 000 FEET

390 000 FEET

(Joins sheet 67)

(Joins sheet 72)

(Joins inset, sheet 75)

2 495 000 FEET

375 000 FEET

73

N

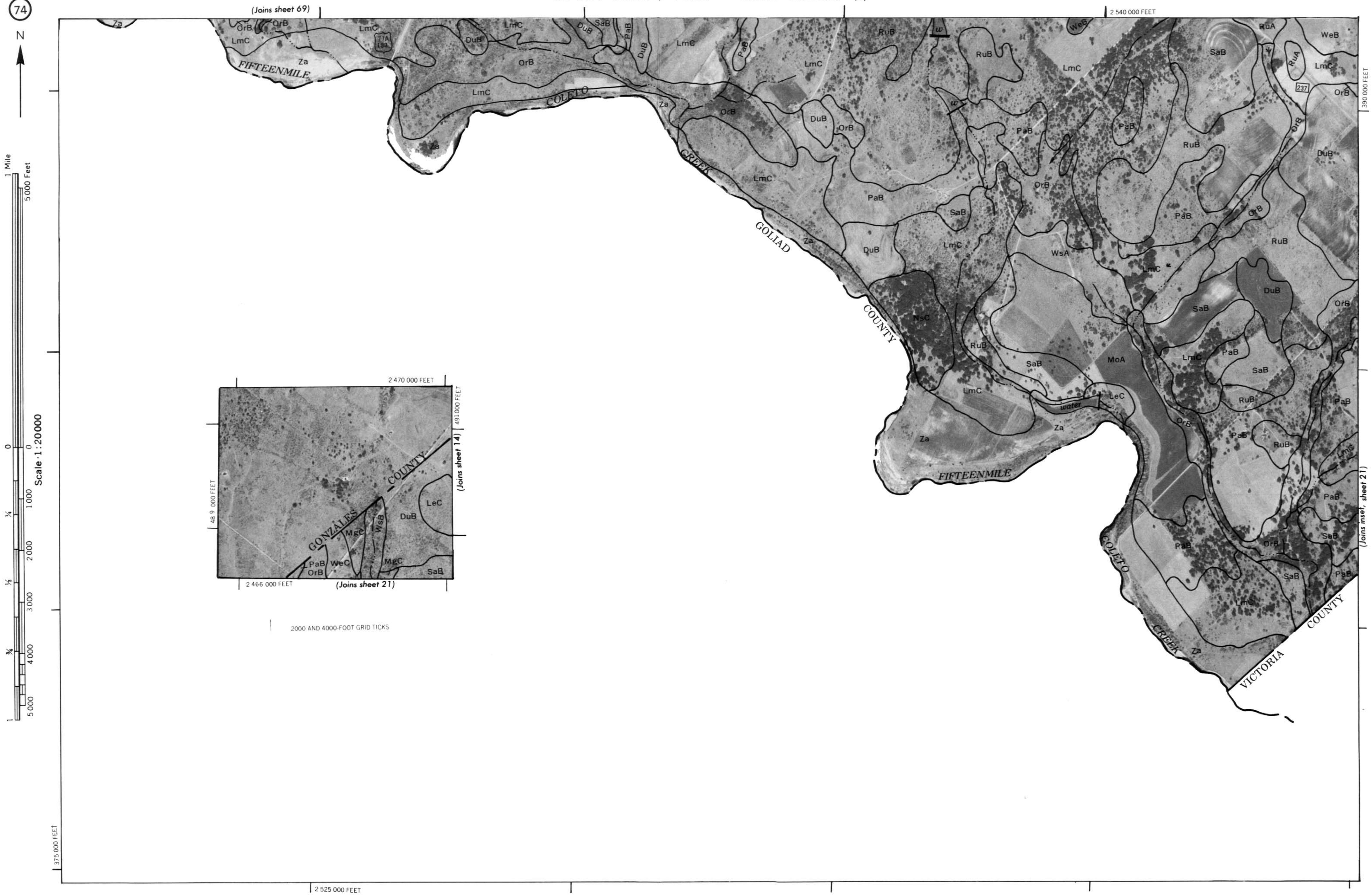
1 Mile

5000 Feet

Scale 1:20000

Eighteenmile Creek

COLORADO COUNTY



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DEWITT COUNTY, TEXAS NO. 74

DE WITT COUNTY, TEXAS — SHEET NUMBER 75

75

DEWITT COUNTY, TEXAS NO. 75

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 450 000 FEET

(Joins inset, sheet 71)

370 000 FEET

(Joins sheet 72)

(Joins inset)

N

1 Mile

5000 Feet

Scale 1:20000

KARNES COUNTY

GOLIAD COUNTY

(Joins sheet 73)

2 472 000 FEET

(Joins sheet 75)

374 000 FEET

371 000 FEET

360 000 FEET

2 475 000 FEET

3000-FOOT GRID TICKS

2 470 000 FEET